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RHEUMATIC HEART DISEASE IN PHILADELPHIA HOSPITALS [1]

A Study of 4,653 Cases of Rheumatic Heart Disease, Rheumatic Fever, Sydenham's Chorea, and Subacute Bacterial Endocarditis, Involving 5,921 Admissions to Philadelphia Hospitals From January 1, 1930, to December 31, 1934

II. AGE, RACE, AND SEX DISTRIBUTION AND INTERRELATION OF RHEUMATIC FEVER, SYDENHAM'S CHOREA, RHEUMATIC HEART DISEASE, AND SUBACUTE BACTERIAL ENDOCARDITIS

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RELATION OF CASES TO ADMISSIONS

The relationship of cases to admissions presents many perplexing problems in the study of an essentially chronic disease such as rheumatic heart disease, which is usually initiated by acute conditions such as rheumatic fever and Sydenham's chorea, and whose course is not infrequently punctuated by recurrences of these conditions, exacerbations of other forms of rheumatic infection, and toward the end by recurrent episodes of congestive heart failure. Part I of this study,[2] which considers these diseases as a hospital problem, is based on admissions. From the viewpoint of hospitals, it matters little whether one case is admitted five times, or five cases are admitted once; the significant factor is the number of patient-days. Few hospitals make any effort to determine the number of individual cases treated, even on an annual basis.

It is not difficult to understand the possible pitfalls which might be encountered were admissions used as a basis for clinical studies. As a case in point, 2 patients were admitted on 41 occasions during the 5-year period under study. To have considered these 2 cases as 41

[1] From the Division of Infectious Diseases, National Institute of Health.

[2] Hedley, O. F.: Rheumatic heart disease in Philadelphia hospitals, part I. Pub. Health Rep., 55: 1599 (1940).

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separate items would have weighted fictitiously certain statistics. One of the patients was a colored female in the 35–39 year age group who required 21 admissions, mostly of short duration, often overnight, for abdominal paracenteses. Since the total number of colored females was relatively small, the age distribution would have been influenced appreciably had statistics been computed on this basis.

There is apparently no simple or entirely satisfactory method for analyzing multiple admissions. To overcome this difficulty and to base the findings on the number of cases, the age of the patient as given at the time of the initial admission during the period under study was frequently used. It is believed that the use of initial admissions during the period under study serves as a satisfactory basis for determining the age distribution of hospital patients suffering from these diseases.

Fortunately, 81.7 percent of the patients were admitted only once, while 12.8 were hospitalized only twice during the period under study. Many of the patients admitted more than once were readmitted after short intervals; as a consequence their ages had not greatly changed.

In some instances the statistics were based on other findings, such as the age at onset as determined by the patient's history, the age at first attack in patients admitted for the first time with a rheumatic manifestation, the age during pregnancy, and other considerations. In each instance efforts have been made to state definitely the basis of the reckoning.

CONDITIONS UNDER STUDY

Of the 4,653 cases under study (table 1), 4,538, or 97.5 percent, were regarded as definitely having a rheumatic condition, while 115 were instances of subacute bacterial endocarditis superimposed on some other type of heart disease, apparently developing without pre-existing cardiac lesions, or in any event in which a definite relationship to rheumatic heart disease could not be determined. Even in some of these 115 cases it was not unlikely that rheumatic heart disease was an underlying factor; it could not be proved, however, with reasonable certainty.

Over 80 percent of patients with rheumatic conditions were diagnosed as having rheumatic heart disease. Nearly 30 percent had rheumatic fever; over 15 percent were indicated as having Sydenham's chorea. Excluding rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis as complications, there were 2,348 cases of uncomplicated rheumatic heart disease—51.7 percent of all rheumatic conditions.

TABLE 1.—*Number of cases and percentage of total cases of rheumatic heart disease, rheumatic fever, Sydenham's chorea, and subacute bacterial endocarditis admitted to 36 Philadelphia civilian hospitals from January 1, 1930, to December 31, 1934. Percentage based on rheumatic infections*

	Number	Percentage of cases
Total cases of rheumatic infections and subacute bacterial endocarditis	4,653	
All rheumatic infections	4,538	100
Rheumatic heart disease	3,654	80.5
Rheumatic fever with rheumatic heart disease	838	18.5
Sydenham's chorea with rheumatic heart disease	[1] 289	6.4
Rheumatic heart disease complicated by subacute bacterial endocarditis	209	4.6
Uncomplicated rheumatic heart disease	[2] 2,348	51.7
Rheumatic fever without heart disease	486	10.7
All rheumatic fever	1,324	29.2
Sydenham's chorea without rheumatic heart disease	[1] 398	8.8
All Sydenham's chorea	687	15.1
Subacute bacterial endocarditis not superimposed on rheumatic heart disease	115	
All subacute bacterial endocarditis	324	

[1] Including 30 in which rheumatic fever and chorea occurred during same admission.
[2] Including 11 in which rheumatic fever and chorea occurred during same admission.

RHEUMATIC FEVER

Etiological relation to rheumatic heart disease—a review of the literature.—A causal relationship between rheumatic fever and valvular heart disease was first described during the closing years of the eighteenth century (*1*). Some of the best clinical descriptions of these conditions extant are contained in yellowing and dust-covered records more than a century old. Haygarth (*2*), in 1805, was the first to write a monograph on this disease. So far as the writer has been able to determine, Haygarth was the first to call it "rheumatic fever." Winnowed from therapeutic concepts no longer tenable, Haygarth's work remains as an accurate account of the salient clinical features and natural history of rheumatic fever. Although rheumatic heart disease was not recognized as a disease entity, its symptoms are portrayed in descriptive detail. Changes in the blood are described which, with more refined technique, might readily be ascribed to leucocytosis. Haygarth even tabulated the frequency of epistaxis during rheumatic episodes.

Although Pitcairn and Jenner had spoken about the relationship of rheumatism to heart disease, it remained for Baillie and Dundas (*1*) to describe it. Even then, it was not until 1826 that Hawkins (*3*) in the Gulstonian lectures considered this problem in any great detail. His account antedates Bouillaud's (*4*) by 10 years, despite the fact that Bouillaud commonly has been given credit for the first accurate description of rheumatic endocarditis and for observing the regularity of its association with rheumatic fever. Even today rheumatic heart disease is known as Bouillaud's disease.

In recent years a number of studies have been made on both sides of the Atlantic Ocean, all affirming the importance of rheumatic fever as an etiological factor in rheumatic heart disease.

The results of 10 of the better known studies reported since 1920 are shown in table 2. In interpreting this table attention is invited to differences in the manifestations under consideration by various investigators. These are largely a question of definition. Except for Mackie's (7) and Brooks and O'Regan's series (*11*), these studies were confined almost exclusively to children. Just as high percentages of rheumatic heart disease are indicated, however, in the studies in which adults are included. Heart disease was diagnosed in 72.6 percent of this somewhat heterogeneous group of cases; of the 2,178 collected cases designated as rheumatic fever, acute rheumatism, and rheumatic arthritis, rheumatic heart disease was recognized clinically in 78.7 percent.

TABLE 2.—*Percentage of rheumatic infection with rheumatic heart disease, based on a review of 10 studies made in the United States and Great Britain since 1920*

Rheumatic manifestation	Number of cases	Percentage with heart disease	Author	Source	Location	Year	Reference
Acute rheumatism	172	66	Poynton et al	Great Ormond Street Hospital.	London	1920	(*5*)
Rheumatic arthritis	100	75	Coombs	Bristol General Hospital.	Bristol	1924	(*6*)
Rheumatic fever	366	68.3	Mackie	Presbyterian Hospital	New York City.	1927	(7)
Rheumatic infection	413	79.5	Wilson et al	Cornell University	do	1928	(*8*)
Rheumatism in children.	124	51	Campbell and Warner.	Guy's Hospital	London	1930	(*9*)
Rheumatic arthritis.	322	75	Findlay	Royal Hospital for Sick Childrgn.	Glasgow	1931	(*10*)
Acute rheumatic fever.	700	84	Brooks and O'Regan.	Several sources		1932	(*11*)
Rheumatic infection	1,200	64	Kaiser	Survey	Rochester, N. Y.	1933	(*12*)
Rheumatic fever without chorea.	518	86	Jones and Bland	House of Good Samaritan.	Boston	1935	(*13*)
Rheumatic infection	445	66.1	Ash	Children's Hospital	Philadelphia.	1936	(*14*)

Age, race, and sex of 1,324 cases of rheumatic fever.—Table 3 shows the age, race, and sex distribution of 1,324 individual cases of rheumatic fever based on the age at initial admission during the period under study. In 838 cases, or 63.3 percent, the clinical records indicated that rheumatic heart disease was recognized, while in 486, or 36.7 percent, the records did not suggest rheumatic cardiac involvement. According to table 3 and figure 1, rheumatic fever is primarily a problem of childhood and early adult life. Only 5 percent of instances of rheumatic fever occurred among persons under 5 years of age, a point which will be discussed in detail in a consideration of the age at onset. Twenty and six-tenths percent of admissions occurred in each of the two quinquennia 5–9 years and 10–14 years. During the 15–19-year age period 13.4 percent of admissions were indicated. Altogether, 59.6 percent of admissions occurred among

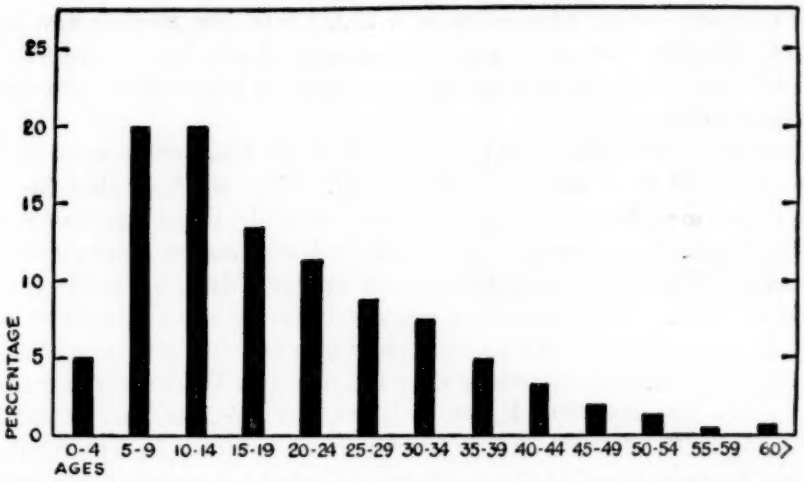

FIGURE 1.—Percentage distribution by 5-year age periods of 1,324 cases of rheumatic fever with or without heart disease, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during this period.

persons less than 20 years of age. With each succeeding age period, a smaller percentage of patients was admitted. Only 7.8 percent of initial admissions during the period under study were among patients older than 40 years.

TABLE 3.—*Age distribution by 5-year periods according to color and sex of 1,324 cases of rheumatic fever with or without heart disease or chorea among patients admitted to hospitals in Philadelphia from January 1, 1930, to December 31, 1934, based on ages at initial admissions during period under study*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	66	5.0	34	5.2	32	4.8	53	5.1	30	5.7	23	4.5	13	4.6	4	3.1	9	6.0
5–9	272	20.6	143	21.7	129	19.5	219	21.1	120	22.7	99	19.4	53	18.8	23	17.6	30	19.9
10–14	273	20.6	147	22.3	126	19.0	216	20.8	120	22.7	96	18.8	57	20.2	27	20.6	30	19.9
15–19	177	13.4	93	14.1	84	12.7	148	14.2	82	15.5	66	12.9	29	10.3	11	8.4	18	11.9
20–24	151	11.4	54	8.2	97	14.7	113	10.9	38	7.2	75	14.7	38	13.5	16	12.2	22	14.6
25–29	117	8.8	54	8.2	63	9.5	87	8.4	39	7.4	48	9.4	30	10.6	15	11.5	15	9.9
30–34	101	7.6	48	7.3	53	8.0	75	7.2	36	6.8	39	7.6	26	9.2	12	9.2	14	9.3
35–39	63	4.8	34	5.2	29	4.4	50	4.8	24	4.5	26	5.1	13	4.6	10	7.6	3	2.0
40–44	42	3.2	22	3.3	20	3.0	30	2.9	15	2.8	15	2.9	12	4.3	7	5.3	5	3.3
45–49	26	2.0	13	2.0	13	2.0	22	2.1	12	2.3	10	2.0	4	1.4	1	.8	3	2.0
50–54	19	1.4	10	1.5	9	1.4	14	1.3	7	1.3	7	1.4	5	1.8	3	2.3	2	1.3
55–59	6	.5	4	.6	2	.3	4	.4	2	.4	2	.4	2	.7	2	1.5	0	0
60 and over	9	.7	4	.6	5	.8	9	.9	4	.8	5	1.0	0	0	0	0	0	0
Undetermined	2	----	0	----	2	----	2	----	0	----	2	----	0	----	0	----	0	----
Total	1,324	----	660	----	664	----	1,042	----	529	----	513	----	282	----	131	----	151	----
Percentage of total	100	----	49.9	----	50.1	----	78.7	----	40.0	----	38.7	----	21.3	----	9.9	----	11.4	----
Mean age	19.6	----	19.3	----	19.9	----	19.8	----	18.6	----	20.2	----	20.4	----	21.9	----	19.0	----
Median age	16.4	----	15.3	----	17.6	----	16.1	----	14.8	----	17.8	----	18.1	----	20.2	----	16.8	----

The mean age of admissions was 19.6 years, the median age 16.4 years. Neither the mean nor median ages of admissions are as significant as the modal age of onset, a factor which will be discussed subsequently.

According to table 3, 78.7 percent of these 1,324 cases were white persons while 21.3 percent were colored. This suggests that race is not a factor of very great importance; certainly there does not seem to be any tendency for the disease to be less common among colored persons. The age distribution is not appreciably influenced on the basis of race. The mean ages are about the same; the median age among the colored is 18.1 and among white persons, 16.1 years.

Studies by most writers including Coombs (*6*), Wilson and her associates (*8*), Findlay (*10*), Kaiser (*12*), Sutton (*15*), Brenner (*16*), and others indicate that rheumatic fever is more common in females than males, in the ratio of 55:45 to 60:40. Mackie (*7*), on the other hand, found that it was equally distributed according to sex. Brooks and O'Regan (*11*) noted that it was considerably more common in males; their series was obtained largely from admissions to an adult ward service and may not have been sufficiently representative. Roth, Lingg, and Whittemore (*17*) noted that rheumatic heart disease is about equally distributed according to sex, and that rheumatic polyarthritis is more likely to occur as the primary manifestation in males. Swift (*18*) states that although polyarthritis is more commonly seen in men than in women, taking all manifestations of rheumatic infection into consideration, females are affected more often than males.

Table 3 also indicates that the distribution of admissions for rheumatic fever is about equal on the basis of sex. In fact, among white persons males predominated slightly; among colored persons the reverse obtained. Even among children there were about as many cases in one sex as the other.

Except for an appreciably greater percentage of cases among persons under 20 years of age, the age distribution of rheumatic fever with heart disease is closely comparable to rheumatic fever without heart disease. Sixty-six percent of rheumatic fever with heart disease occurred during the first two age decades; only 48.6 percent of rheumatic fever without heart disease was indicated during that age period (table 4). Less than 10 percent in either group was indicated among persons past 40 years of age. This suggests that most of the diagnoses of rheumatic fever at all age periods were made in accordance with commonly accepted standards, and that few cases of rheumatoid and infectious arthritis were erroneously diagnosed as rheumatic fever.

TABLE 4.—*Age distribution by 5-year periods of 1,324 cases of rheumatic fever, 838 of which were diagnosed as having rheumatic heart disease, and 486 not diagnosed as having rheumatic heart disease, in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the ages at initial admission during the period under study. Also percentage of cases of rheumatic fever with heart disease in each age period*

Age (years)	All rheumatic fever		Rheumatic fever with heart disease		Rheumatic fever without heart disease		Percentage with heart disease
	Number	Percent	Number	Percent	Number	Percent	
Under 5	66	5.0	43	5.1	23	4.7	65.2
5–9	272	20.6	190	22.7	82	16.9	69.9
10–14	273	20.6	193	23.1	80	16.5	70.7
15–19	177	13.4	126	15.1	51	10.5	71.2
20–24	151	11.4	88	10.5	63	13.0	58.3
25–29	117	8.8	67	8.0	50	10.3	57.3
30–34	101	7.6	52	6.2	49	10.1	51.5
35–39	63	4.8	20	2.4	43	8.8	31.7
40–44	42	3.2	26	3.1	16	3.3	61.9
45–49	26	2.0	14	1.7	12	2.5	53.8
50–54	19	1.4	12	1.4	7	1.4	63.2
55–59	6	.5	2	.2	4	.8	33.3
60 and over	9	.7	3	.4	6	1.2	33.3
Unknown	2		2		0	0	
Total	1,324	100	838	100	486	100	63.3

The age distribution of clinical cases in Philadelphia hospitals is greatly at variance with the age distribution of 370 deaths reported as due to rheumatic fever by physicians in Philadelphia to the State Office of Vital Statistics during the same 5-year period:

Age (years)	*Number of deaths*	*Percentage*
Under 10	68	18.4
10–19	88	23.8
20–29	66	17.8
30–39	54	14.6
40–49	34	9.2
50–59	14	3.8
60 and over	46	12.4
	370	100

Compared with table 4, the age distribution of deaths reported as due to rheumatic fever is out of line in many respects with the age distribution of clinical cases in hospitals. It is not unlikely that, if morbidity from rheumatic fever were made notifiable among persons at all ages, various forms of arthritis and other conditions common among persons past 40 years of age would not infrequently be reported as rheumatic fever. Atwater (*19*) has also commented upon the lack of agreement between the age distribution of clinical diagnosis of rheumatic fever and mortality attributed to this condition.

Percentage of rheumatic fever with rheumatic heart disease.—According to table 4, clinical evidence of heart disease was recognized in 63.3 percent of 1,324 cases of rheumatic heart disease during initial admission to Philadelphia hospitals during the period under study. This percentage is not as great as indicated by most writers (see table 2).

The most probable explanation is that this series was confined solely to hospital cases, while other writers usually had the opportunity to follow their patients after discharge. Often a definite diagnosis of rheumatic heart disease cannot be made without protracted observation. Most of the studies described in table 2 are confined almost exclusively to children; however, the percentage of rheumatic heart disease was at least equally as high in Brooks and O'Regan's (*11*) and Mackie's (*7*) series. Probably none of these studies is based on as representative or unselected a group of cases as the present series.

It is also likely that there has been a diminution in the severity of rheumatic fever since some of the studies listed in table 2 were made. A tendency in this direction has been noted by Atwater (*19*), Swift (*18*), the writer (*21*), and the experience of the Metropolitan Life Insurance Company (*22*). Ash (*14*) recently expressed the view,

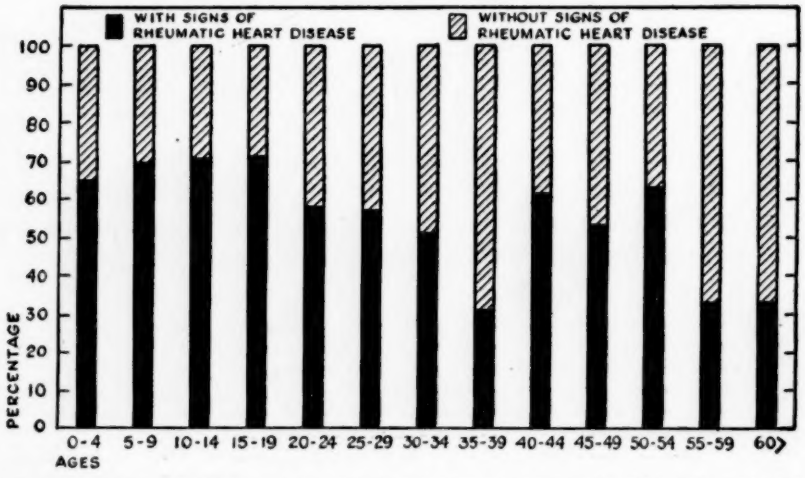

FIGURE 2.—Percentage of 1,324 cases of rheumatic fever by 5-year age groups, in which a diagnosis of rheumatic heart disease was made, based on initial admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

based on a follow-up study of cases at the Philadelphia Children's Hospital, that the disease was becoming milder.

It is also not unlikely that physicians are now more conservative in diagnosing rheumatic heart disease than they were a decade ago. Owing to the widespread adoption of the criteria for diagnosis of the American Heart Association (*23*), it is possible for a physician to make the diagnosis of *potential* heart disease in patients who have rheumatic fever but without definite evidence of cardiac involvement, or of *possible* heart disease in patients with equivocal signs of heart disease. Final opinion is often withheld for some time pending developments.

Table 4 and figure 2 indicate that rheumatic heart disease develops in about 70 percent of patients under 20 years of age during hospital

admission. In each succeeding 5-year period subsequent to 20 years of age a smaller percentage of rheumatic heart disease was indicated, until the 35–39-year age period in which only 31.7 percent of cases were recognized as having rheumatic heart disease. During the three 5-year periods, 40–54 years, higher percentages of heart disease were indicated, a tendency not observed by Mackie (7). Among the very small number of cases in patients over 55 years of age only a third were diagnosed as having rheumatic heart disease. Figure 2 should be interpreted in the light of table 4, taking into consideration the small number of cases among persons over 40 years of age.

Age distribution of onset of rheumatic fever.—The clinical records of 2,734 cases indicated a history of rheumatic fever. In 862 instances

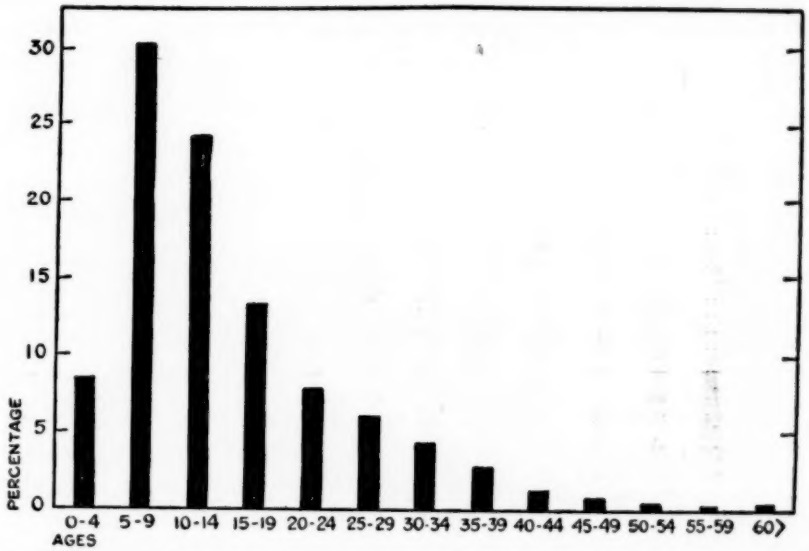

FIGURE 3.—Percentage distribution by 5-year age periods of 2,539 first attacks of rheumatic fever, with or without rheumatic heart disease, based on past or present histories, among cases admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

the onset of rheumatic fever occurred during a current admission, while in 1,872 cases the onset of rheumatic fever antedated the first admission under study. Of these 2,734 attacks of rheumatic fever, the age at onset was recorded in 2,539, or 92.9 percent. In the other 195 cases a history of rheumatic fever was admitted, but the age at first attack was either not given or was indefinite.

Table 5 and figure 3 record the ages at onset of 2,539 cases of rheumatic fever, based on current admissions or previous histories. These indicate that 8.5 percent of rheumatic fever develops during the age period under 5 years, 30.1 percent during the 5–9-year age period, 24.5 percent during the 10–14-year age period, 13.3 percent during the 15–19-year age period, 7.8 percent during the 20–24-year age period, 6.1 percent during the 24–29-year age period, 4.3 percent

during the 30–34-year age period, 2.8 percent during the 35–39-year age period, and only 2.7 percent among persons older than 40 years.

TABLE 5.—*Age distribution by 5-year age groups, according to race and sex, of the first attacks of 2,539 cases of rheumatic fever with or without heart disease, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the age at first admission or on history of the age at first attack*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	215	8.5	82	7.1	133	9.7	194	9.1	71	7.2	123	10.7	21	5.2	11	6.3	10	4.4
5–9	765	30.1	348	29.9	417	30.3	685	32.1	318	32.2	367	31.9	80	19.9	30	17.2	50	21.9
10–14	622	24.5	281	24.2	341	24.8	522	24.4	245	24.8	277	24.1	100	24.9	36	20.7	64	28.1
15–19	337	13.3	169	14.5	168	12.2	279	13.1	144	14.6	135	11.7	58	14.4	25	14.4	33	14.5
20–24	197	7.8	88	7.6	109	7.9	148	6.9	64	6.5	84	7.3	49	12.2	24	13.8	25	11.0
25–29	155	6.1	68	5.9	87	6.3	114	5.3	49	5.0	65	5.7	41	10.2	19	10.9	22	9.6
30–34	109	4.3	51	4.4	58	4.2	84	3.9	39	3.9	45	3.9	25	6.2	12	6.9	13	5.7
35–39	70	2.8	37	3.2	33	2.4	56	2.6	28	2.8	28	2.4	14	3.5	9	5.2	5	2.2
40–44	31	1.2	17	1.5	14	1.0	23	1.1	13	1.3	10	.9	8	2.0	4	2.3	4	1.8
45–49	18	.7	7	.6	11	.8	15	.7	6	.6	9	.8	3	.7	1	.6	2	.9
50–54	10	.4	9	.8	1	.1	9	.4	8	.8	1	.1	1	.2	1	.6	0	0
55–59	3	.1	2	.2	1	.1	1	.1	0	0	1	.1	2	.5	2	1.1	0	0
60 and over	7	.3	3	.3	4	.3	7	.3	3	.3	4	.4	0	0	0	0	0	0
Total	2,539	100	1,162	100	1,377	100	2,137	100	988	100	1,149	100	402	100	174	100	228	100
Percentage of total				45.8		54.2		84.2		38.9		45.3		15.9		6.9		9.0
Mean age	14.5		15.0		14.1		14.0		14.4		13.7		17.3		18.5		16.3	
Median age	12.3		12.7		12.0		11.8		12.1		11.5		15.0		17.0		14.2	
Modal age	8.7		8.9		8.6		8.6		8.9		8.5		12.1		12.3		12.0	

The percentage distribution of ages of onset of 862 cases of rheumatic fever which were admitted during the first attack of fever was essentially similar to the age of onset of these 2,734 cases, in 1,872 of which the onset of rheumatic fever occurred prior to this study. On the basis of age decades, the age distribution for these 862 cases was as follows:

Age (years)	*Number*	*Percentage*
Under 10	283	32.8
10–19	306	35.5
20–29	147	17.1
30–39	81	9.4
40 and over	42	4.9
Unknown	3	.3
	862	100

Compared with table 5, these percentages suggested a slightly older age distribution among cases with onset during an admission under study, due probably to a larger proportion of rheumatic fever without heart disease in this group.

Of the 215 cases of rheumatic fever in which the initial attack occurred in persons less than 5 years of age, none occurred in infants

of less than 1 year; 17 occurred among persons 1 year old, and 37 among persons 2 years old; in the other 161 cases the first rheumatic episode developed in children 3 and 4 years old. Of the 54 instances in which the onset of rheumatic fever occurred under 3 years of age, only 8 attacks occurred during an admission under study. The relative rarity of rheumatic fever during infancy has been commented upon frequently. Paul (*24*), citing its extreme infrequency among infants, mentions that only 40 cases in children less than 1 year of age have been reported in the literature. Kissane and Koons (*25*) demonstrated a case of intrauterine rheumatic heart disease in which the diagnosis was confirmed post mortem. The mother had rheumatic fever at 12 years of age and a severe recurrence during pregnancy. They also reviewed the literature and cited 4 other cases. Richdorf and Griffith (*26*) reported a case of polyarthritis in a 6-day-old infant whose mother had rheumatic fever during pregnancy. White (*27*) also comments upon the rarity in infancy. Denzer (*28*) reported 3 cases of rheumatic heart disease in children under 2 years of age; 2 were confirmed post mortem. McIntosh and Wood (*29*) reported 24 instances of rheumatic heart disease during the first 3 years of life; in 6 the diagnosis was sustained by necropsy. Eigen (*30*) and Fisher (*31*) also cite examples of rheumatic infection in infancy.

The onset of the greatest number of cases, 30.1 percent, was indicated during the age period 5–9 years. The mode, or age of greatest frequency, of the 2,539 cases in which the age at onset was recorded, was 8.9 years. The mode of the 862 cases in which the onset of rheumatic fever occurred during an admission under study was 10.5 years. The mean age at onset of the 2,539 cases, most of which developed prior to admission, was 14.5 years, and the median age at onset, or midpoint of greatest frequency, was 12.3 years.

The mode age at onset is in agreement with the findings of a number of investigators (table 6), all of whom, with 2 exceptions, were concerned only with rheumatic infection in childhood. The mean age at onset is greater by several years than reported by most writers, because this series comprises cases at all ages; most of the series in table 6 are limited to children less than 12 years of age. The mean age of any series is largely dependent on the range of ages under consideration and for that reason is not considered as significant as the mode. The fact that the mean of onset determined by many investigators of rheumatic infection in childhood coincides so closely with the mode is largely fortuitous. The median age is somewhat more significant but is also dependent in a large measure on the spread of a series.

TABLE 6.—*Age at onset of rheumatic infection, based on review of the literature*

Diagnosis	Number of cases	Source	City	Age (years)	Basis	Author	Remarks	Reference
First rheumatic manifestation	131	Children's Heart Hospital	Philadelphia	7.3	Mean	Stroud et al	Children only	(22)
Do	445	Children's Hospital	do	6.8	do	Ash	do	(14)
Do	1,126		Rochester, N. Y	10	Mode	Kaiser	do	(12)
Rheumatic arthritis	364	Royal Hospital for Sick Children.	Glasgow, Scotland	7.0	do	Findlay	do	(10)
Rheumatic fever and chorea	623	Several sources	New York	7–9	do	Sutton	do	(15)
Rheumatic carditis	253	Bristol General Hospital	Bristol, England	10.2	Mean	Coombs	do	(6)
Rheumatic infection	413	Cornell University	New York	7.3	do	Wilson et al	do	(8)
Rheumatic infection	713	Lymanhurst Sanatorium	Minneapolis	5–6	Mode	Shapiro	do	(33)
Acute rheumatism	172	Great Ormond Street Hospital.	London	7	do	Poynton et al	do	(5)
Rheumatic cardiac disease	128	King's County Hospital	Brooklyn	6	do	Taran	do	(34)
Rheumatism and chorea	250	Guy's Hospital	London	7–8	do	Campbell and Warner	do	(9)
Initial rheumatic infection	488	Mt. Sinai Hospital	New York	8	Mean	Roth et al	do	(17)
Do	488	do	do	7	Mode	do	do	(17)
Rheumatic fever	383	Presbyterian Hospital	do	10–15	do	Mackie	All ages	(7)
Initial rheumatic infection	644	Bellevue Hospital	do	9–11	do	DeGraff and Lingg	All ages (fatal cases)	(35)
Do	644	do	do	16.8	Mean	do	do	(35)
Do	644	do	do	14	Median	do	do	(35)
Rheumatic fever	500	Yale University	New Haven	7	Mode	Leonard	Children only	(36)

The study by DeGraff and Lingg (*35*) was more nearly comparable to this study than any other recorded in table 6. DeGraff and Lingg investigated 1,633 patients with rheumatic heart disease seen for the most part in the adult cardiac clinic of the Bellevue Hospital in New York City. They analysed in detail the age at onset and history of 644 fatal cases, supplementing this group with cases obtained from other sources to overcome certain obvious possible sources of error. Based on these adjusted curves, they placed the mean age of onset at 16.8 years and the median age of onset at 14 years. The mode falls earlier at 9, 10, and 11 years, corresponding quite closely to that of 8 years reported by Wilson, Lingg, and Croxford (*8*) and to 8.7 years as indicated in this study (table 5).

Approaching the problem from a somewhat different point of view, Paul (*37*) found that susceptibility to rheumatic fever was greatest in the age group 5–12 years and reached its peak at about the age of 7 years. His studies were based on an investigation of the spread of rheumatic infection in families in which two or more individuals had suffered from evidences of rheumatic fever.

In the present study no great differences were indicated in the age distribution, and the mean, median, and modal ages of onset on the basis of sex (table 5). It should be noted, however, that among the 2,539 cases with a definite history of rheumatic fever, 54.2 percent were females and only 45.8 percent were males. This is in contrast to table 3 in which the distribution according to sex was approximately equal. The distribution according to sex by 5-year age periods suggests that rheumatic fever is more likely to develop in younger females while among older persons it is more likely to occur among males, a tendency noted by Swift (*18*) and by DeGraff and Lingg (*35*).

An onset of rheumatic fever at somewhat older ages among colored persons than white persons was indicated. The greatest percentage of first attacks among colored persons occurred during the 10–14-year age period as compared with the 5–9-year age period among white persons. A greater susceptibility to rheumatic fever among colored adults is suggested by the fact that 32.1 percent of rheumatic fever developed during the two age decades 20–39 years, as compared with only 18.7 percent among white persons. This difference may be due in part to peculiarities in the age distribution of the colored population of Philadelphia because of the migration from the South of a large number of young adults during recent years. Boas (*38*) has pointed out the severity of rheumatic carditis in adult Puerto Rican immigrants in New York City; he did not suggest, however, that the incidence of rheumatic fever was greater among that group. Part III of this series of articles and a study by the writer (*39*) indicate an unusually high percentage of deaths from rheumatic heart disease among Negro males aged 10–19 years. The fact that a relatively large number of

cases of rheumatic fever have their onset during this age period, especially during the 10–14-year period, suggests that rheumatic heart disease is more likely to occur in an extremely severe form among young Negro males. To what extent this is due to improper facilities or failure to cooperate in treatment cannot be estimated. It is the impression of the writer, based on the observation of clinical cases, that rheumatic infection attacks Negro boys with greater than average severity.

Another possibility for the apparently greater percentage of rheumatic fever in colored adults is that they may have failed to a greater extent to remember rheumatic episodes in earlier life. In none of the

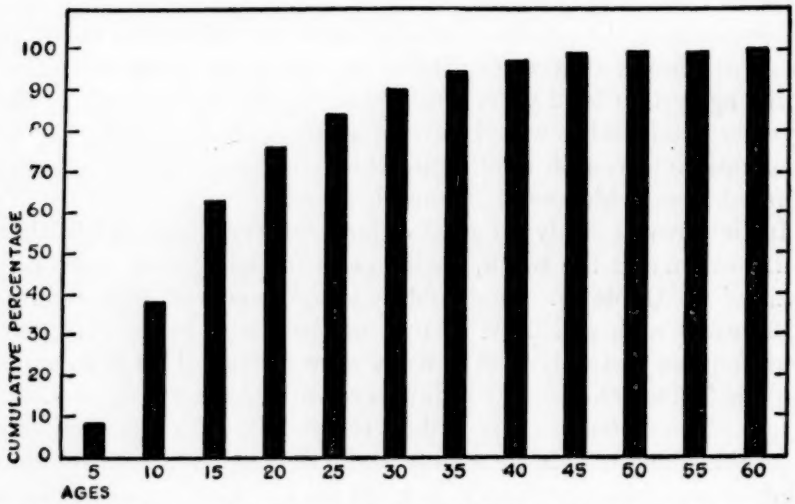

FIGURE 4.—Cumulative percentage by 5-year age periods of 2,539 first attacks of rheumatic fever, with or without rheumatic heart disease, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934, and based on past or present histories of rheumatic fever.

race-sex groups was there indication that many cases developed among persons past 40 years of age.

Cumulative percentage of age of onset.—According to table 5 and figure 4 the onset of 8.5 percent of rheumatic fever occurred prior to 5 years of age, 38.6 percent prior to 10 years, 63.1 percent prior to 15 years, 76.4 percent prior to 20 years, 84.2 percent prior to 25 years, 90.3 percent prior to 30 years, and only 2.7 percent among persons past 40 years of age.

Over three-fourths of the cases of rheumatic fever have their onset during the first two decades of life. This is indicative of the fact that rheumatic fever is primarily a problem of childhood and adolescence. Measures directed toward the prevention of rheumatic heart disease or the amelioration of its effects should largely be concentrated on rheumatic infection among persons under 20 years of age, because not only is rheumatic fever more likely to occur during that period

but rheumatic heart disease is more likely to develop, and with greater severity.

It is a mistake, however, to regard rheumatic fever as exclusively a disease of childhood. The designations "juvenile rheumatism" and "childhood rheumatism" are greater misnomers than "infantile paralysis," a term which investigators of anterior poliomyelitis regard as most unfortunate. "Juvenile rheumatism" is particularly inappropriate because, unlike anterior poliomyelitis, rheumatic fever is often the primary manifestation of an essentially chronic disease subject to recrudescences and exacerbations. Unlike anterior poliomyelitis, recurrences of rheumatic fever are more nearly the rule than the exception. Signs of rheumatic activity may occur at any age.

SYDENHAM'S CHOREA

Etiological relation to rheumatic heart disease—a review of the literature.—There was no doubt in the minds of the earlier writers concerning the role of Sydenham's chorea as a cause of acquired heart disease in young persons.

Osler (*42*) stated: "Acute endocarditis, commonly of the mitral leaflets, occurs with great frequency in chorea, and the remarkable statement that there is no other disease, not even acute rheumatism, which is so frequently accompanied by valvulitis, seems justifiable.

"The extraordinary frequency with which mitral valvulitis is met with in fatal cases is remarkable. *There is no known disease in which endocarditis is so constantly found, post-mortem, as chorea;* it is exceptional to find the heart healthy." [Italics Osler's.]

Osler noted the occurrence of heart murmurs among 170, or 30.7 percent, of 554 cases of chorea in Philadelphia; in 149 the murmurs were apical in maximum intensity; in 21 basic. Over 51 percent of 140 cases of Sydenham's chorea followed for at least 2 years presented definite signs of damage to the heart. Among 73 collected cases of chorea studied post mortem, cardiac lesions of the rheumatic type were demonstrated in 90.4 percent.

Stephen Mackenzie (*40*) in a collective investigation for the British Medical Association reported that 32 percent of 439 patients had varying degrees of cardiac affection during attacks of chorea. Sturges (*41*) noted that 34 percent of 132 cases presented signs of organic cardiac involvement. Heart disease was indicated in 44 percent of Coombs' (*6*) series of 100 cases.

The percentage of cases of Sydenham's chorea reported by a number of investigators as manifesting signs of rheumatic heart disease is shown in table 7, and varies from 3 percent to 77.3 percent. To a certain extent it is dependent on the length of observation, but this is by no means invariable. Thayer (*43*) and Strong (*48*) emphasized

that cardiac involvement increases in proportion to the number of attacks of chorea.

TABLE 7.—*Review of the literature indicating percentage of rheumatic heart disease in Sydenham's chorea*

Number of cases of chorea	Percentage with rheumatic heart disease	Author	Source	Location	Year	Reference
439	32	Mackenzie	Survey for British Medical Association.	London	1887	(40)
132	34	Sturges	Personal observations	do	1893	(41)
140	51	Osler	Philadelphia Infirmary for Nervous Diseases.	Philadelphia	1894	(42)
689	25.4	Thayer	Johns Hopkins Hospital	Baltimore	1906	(43)
800	63	Frazer	Paddington Green Hospital	London	1912	(44)
226	36	Abt and Levinson	Sarah Morris Hospital	Chicago	1916	(45)
138	26	Helmholtz		do	1916	(46)
319	72	Koplik	Personal observations	New York	1919	(47)
100	45	Strong	Peter Bent Brigham Hospital.	Boston	1923	(48)
100	44	Coombs	Bristol General Hospital	Bristol	1924	(6)
66	51	Mackie	Presbyterian Hospital	New York	1926	(7)
47 (pure)	34	Campbell and Warner	Guy's Hospital	London	1930	(9)
75 (mixed)	56	do	do	do	1930	(9)
345	59	Findlay	2 large hospitals	Glasgow	1931	(10)
215	41.5	Wallace	Royal Infirmary	Edinburgh	1933	(49)
134 (pure)	8	Jones and Bland	House of Good Samaritan	Boston	1935	(13)
348 (mixed)	73	do	do	do	1935	(13)
45	27	Gerstley et al	Several sources	Chicago	1935	(50)
75 (pure)	77.3	Schwarz and Leader	Mt. Sinai Hospital	New York	1935	(51)
45 (pure)	13.3	Ash	Children's Hospital	Philadelphia	1936	(14)
87 (mixed)	71.5	do	do	do	1936	(14)
78 (pure)	53	Parrish et al	Kings County Hospital	Brooklyn	1937	(52)
84 (mixed)	76	do	do	do	1937	(52)
91 (pure)	20	Sutton and Dodge	Bellevue Hospital	New York	1938	(53)
243 (mixed)	75	do	do	do	1938	(53)
49 (mixed)	65	Usher	Children's Hospital	Montreal	1938	(54)
56 (pure)	14	do	do	do	1938	(54)

Total: All chorea—46.5 percent of 4,616 cases.
"Pure" chorea—28.8 percent of 526 cases.
"Mixed" chorea—71.6 percent of 836 cases.

During recent years doubt has been expressed concerning the relationship of Sydenham's chorea to rheumatic infection and its place in the etiology of rheumatic heart disease. Several writers have questioned whether so-called "pure" chorea, i. e., chorea without clinical or laboratory evidence of infection, should be regarded as part of the rheumatic syndrome, or at least more than a rather mild rheumatic manifestation accompanied very infrequently by cardiac damage. They point out that when endocarditis supervenes there are almost invariably other signs of rheumatic infection.

Among the proponents of this view are Coburn and Moore (*55*), Jones and Bland (*13*), Usher (*54*), and Gerstley, Wile, Falstein, and Gayle (*50*). Coburn and Moore (*55*) state that in their experience one-half of all cases of chorea occur in individuals without other rheumatic manifestations and with normal sedimentation rates. They go so far as to state definitely that they do not regard chorea *per se* as sufficient evidence for the diagnosis of rheumatic infection. Jones and Bland (*13*) found that only 3 percent of "pure" chorea developed rheumatic

heart disease as compared with 73 percent of "mixed" chorea, i. e., chorea with other rheumatic manifestations. Usher (*54*) found evidence of heart disease in 65 percent of chorea in combination with rheumatism and other signs of infection as compared with only 14 percent of "pure" chorea. He regards heart disease as not due to chorea but to intercurrent infections. Gerstley and his associates (*50*) state that only 6 of 150 cases of chorea gave definite histories of rheumatic fever, and only 12 had endocarditis. They regard histories of uncomplicated chorea as infrequent in patients with rheumatic heart disease and do not regard chorea as a manifestation of rheumatic fever, but as due to psychic trauma in predisposed individuals.

Parrish, Taran, and Starr (*52*), Sutton and Dodge (*53*), and Schwarz and Leader (*51*) regard chorea as an important manifestation of rheumatic infection, prone to result in rheumatic heart disease. Parrish, Taran, and Starr found evidence of heart disease in 53 percent of "pure" chorea as compared with 76 percent of "mixed" chorea. They state, "Until the etiological agent is known, it is reasonable to assume that chorea is one of the rheumatic manifestations." They indicate that chorea occurs in the same type of children and under environmental conditions similar to rheumatic fever. Sutton and Dodge (*53*) indicate that heart disease develops in 20 percent of those who have had chorea as the only rheumatic manifestation, as compared with 75 percent of "mixed" chorea. They state that the child in whom the rheumatic state is initiated with an attack of chorea has a 50 percent chance of developing heart disease. They conclude, "Chorea should continue to be regarded not only as a manifestation but as a serious manifestation of rheumatic infection." Schwarz and Leader (*51*) followed 75 cases of "pure" chorea over a period of 1 to 12 years and found cardiac involvement in 77.3 percent; they concluded that chorea is followed by heart disease in most cases.

Ash (*14*), in Philadelphia, takes a view between these extremes, and regards chorea as a mild rheumatic manifestation in which heart disease is much less likely to develop when other signs of rheumatic infection are absent. Heart disease was exhibited in only 13.3 percent of 45 cases of "pure" chorea observed over an average period of 7½ years, as compared with 71.5 percent of 87 cases of chorea with joint pains. The incidence of heart disease in cases of chorea with arthritic manifestations was even slightly higher than the incidence in cases of rheumatic arthritis alone.

To the writer these attempts to divide chorea into "pure" and "mixed" forms appear somewhat arbitrary, although it is true that heart disease is less likely to develop in Sydenham's chorea unattended by other signs of rheumatic infection. The inconsistency of this over-refinement of diagnosis is that when a case of "pure" chorea

develops any other rheumatic manifestation, it is immediately placed in the "mixed" category.

The fact remains that a child with Sydenham's chorea stands an infinitely greater chance of developing rheumatic heart disease. For example, approximately 1 percent of children have rheumatic heart disease. At least a fifth of these have histories of chorea. On this basis, rheumatic heart disease occurs in approximately 0.8 percent of children without histories of chorea. According to table 7, rheumatic heart disease was indicated in 46.5 percent of 4,616 cases of chorea collected from the literature. Even among 526 instances of so-called "pure" chorea, rheumatic heart disease was diagnosed in 28.8 percent. Judged by these standards, a child with chorea has a 5,700 percent greater chance of developing heart disease; a child with so-called "pure" chorea stands approximately a 3,500 percent greater opportunity of having heart disease than a nonchoreic child. Even on the basis of Jones and Bland's (*13*) finding of 3 percent of rheumatic heart disease in so-called pure chorea, the incidence is about 275 percent higher than estimated in nonchoreic individuals.

Age, race, and sex of 687 cases of Sydenham's chorea.—Table 8 shows the age distribution, by 5-year periods, according to color and sex, of 687 cases of Sydenham's chorea, based on the age at the initial admission during the period of this study. Of these 687 cases of Sydenham's chorea, 289, or 42.1 percent, also exhibited signs of rheumatic heart disease, while in 398 cases, or 57.9 percent, heart disease was not recognized during hospital residence.

TABLE 8.—*Age distribution, by 5-year age periods, according to race and sex, of 687 cases of Sydenham's chorea with or without rheumatic heart disease or rheumatic fever admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the age of the patient during the initial admission in the period under study*

Age (years)	Total						White						Colored		
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes (number)	Male (number)	Female (number)
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent			
Under 5	18	2.6	6	2.5	12	2.7	16	2.5	5	2.2	11	2.6	2	1	1
5–9	319	46.5	131	55.0	188	42.0	305	47.2	124	55.1	181	43.0	14	7	7
10–14	297	43.3	94	39.5	203	45.3	279	43.2	90	40.0	189	44.9	18	4	14
15–19	32	4.7	5	2.1	27	6.0	29	4.5	4	1.8	25	5.9	3	1	2
20–24	12	1.7	1	.4	11	2.5	10	1.5	1	.4	9	2.1	2	0	2
25–29	4	.6	1	.4	3	.7	3	.5	1	.4	2	.5	1	0	1
30 and over	4	.6	0	0	4	.9	4	.7	0	0	4	.9	0	0	0
Age unknown	1	----	0	----	1	----	1	----	0	----	1	----	----	----	----
Total	687	100	238	100	449	100	647	100	225	100	422	100	40	13	27
Percentage of total	----	100	----	34.7	----	65.3	----	94.2	----	32.8	----	61.4	5.8	1.9	3.9
Mean age	10.5	----	9.6	----	10.9	----	10.4	----	9.7	----	10.8	----	11.4	9.3	12.4
Median age	10.1	----	9.3	----	10.6	----	10.0	----	9.3	----	10.5	----	11.1	8.9	12.0

Unlike rheumatic fever, in which only 46.2 percent of admissions occurred among persons under 15 years of age (table 3), 92.4 percent of admissions for chorea were indicated during this age period. For practical purposes, admissions for chorea were largely confined to the 5–14-year age period, in which 89.8 percent occurred. Only 2.6 percent were among persons under 5 years, while only 7.6 percent occurred among persons older than 15 years.

This age distribution is in substantial agreement with a number of studies, except for the possibility that years ago slightly more cases occurred among persons over 15 years of age. Osler (*42*) noted that over three-fourths of 522 cases occurred during the second and third 5-year age periods. Stephen Mackenzie (*40*) reported that only 20.7

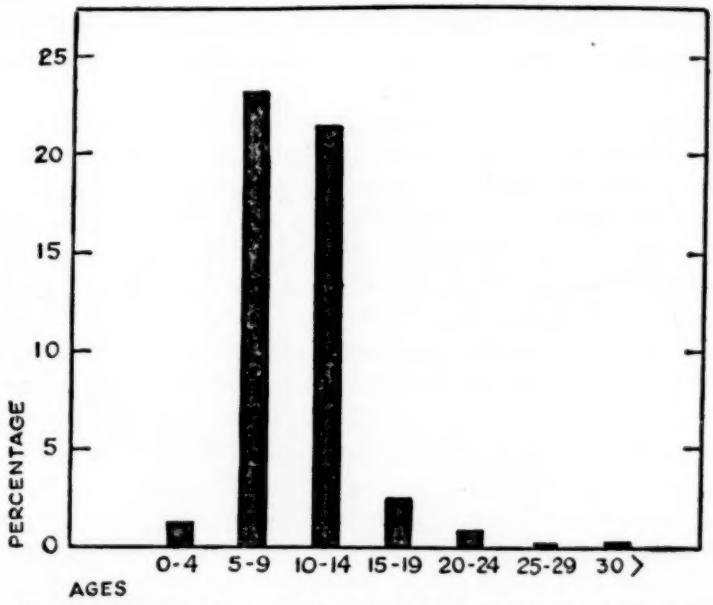

FIGURE 5.—Percentage distribution by 5-year age periods of 687 cases of Sydenham's chorea, with or without rheumatic heart disease, admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during period under study.

percent of 439 cases were among persons over 16 years. In Thayer's (*43*) series of 808 cases, 84.5 percent occurred between the ages of 5 and 15. There is also general agreement that chorea is infrequent under the age of 5.

With the possible exception of similar reports among foreign armies, the report by Love and Davenport (*56*) on physical defects among drafted men in the United States during the World War is the only source suggesting any great degree of frequency of chorea among adults. The schedules of this voluminous work contain 593 cases diagnosed as chorea. These authors regard chorea as a generic term including Sydenham's chorea, Huntington's chorea, and probably certain forms

of sclerosis of the spinal tract. While they do not mention it, there is also the possibility that during wartime exigencies, encephalitis following the influenza epidemic was sometimes mistaken for chorea.

Most well-authenticated instances of chorea in adults are associated with pregnancy. These are comparatively rare. In 1932, Willson and Preece (*57*) were able to collect only 951 cases of chorea gravidarum. They found that women attacked are predominantly in the youngest age group of sexual maturity and are mostly primaparae; more than half gave histories of a previous attack. Only two cases of chorea gravidarum were encountered in the present study.

Because of the common observation that Sydenham's chorea occurs with such great frequency during the decade before puberty and generally disappears at puberty regardless of treatment, Gerstley and his associates (*50*) suggest that it is due in part to an endocrine factor. This possibility is rendered more likely since almost the only time it is seen in adults is during pregnancy.

According to table 8, the greatest frequency of admissions among males was during the 5–9-year age period, and among females during the 10–14-year age period. A smaller percentage of admissions was noted among males than females over age 15. This further suggests the possibility of an endocrine factor. So few cases were met with among colored persons that it is not possible to make a comparative study of the age distribution.

Nearly twice as many cases occurred among females as among males. Nearly every investigator of this disease has commented upon the greater frequency in girls; in most studies the proportion is between 2 and 3 to 1. The percentage of cases with and without heart disease was practically the same in each sex.

Only 5.8 percent of 687 cases of chorea were among Negroes. According to the United States Census of 1930, 11.3 percent of the population of Philadelphia was colored. Owing to their less favorable economic status, colored persons are more likely to be hospitalized. At the present time, for example, Negroes comprise about 45 percent of all admissions to the Philadelphia General Hospital; this percentage was probably somewhat smaller during 1930–34. It appears, therefore, that Sydenham's chorea is distinctly less common among Negroes. It is noteworthy that among the 398 cases of simple Sydenham's chorea without heart disease only 3.5 percent were in Negroes, while among 289 cases of chorea with heart disease 9 percent were in Negroes. This suggests that chorea among Negroes is more likely to be attended by cardiac involvement.

Nearly 60 years ago S. Weir Mitchell (*58*), of Philadelphia, concluded on the basis of personal observations and a questionnaire study among physicians in the South, that Sydenham's chorea was relatively rare among Negroes. Thayer (*43*) found only 3 percent of

808 cases at the Johns Hopkins Hospital among colored persons, although the proportion of Negroes treated for all conditions amounted to about 12 percent. Osler (*42*) considered chorea rare among Negroes. Not long ago Lueth and Sutton (*59*) expressed doubt concerning its relative infrequency among Negroes, and pointed out that 9 of 58 cases which they had seen in Chicago were among Negroes. The present study suggests that although chorea is apparently distinctly less common among Negroes it should not be regarded as a rare disease.

According to table 9 the age distribution, mean, and median ages of chorea with and without rheumatic heart disease are quite similar. A slightly greater percentage of chorea with heart disease was noted in the 5–9-year age period. In neither group were many admissions indicated among persons over 15 years of age.

TABLE 9.—*Age distribution by 5-year periods of 687 cases of Sydenham's chorea, 289 of which were diagnosed as having rheumatic heart disease and 398 diagnosed as not having rheumatic heart disease, in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during the period under study. Also percentage of cases of chorea with rheumatic heart disease in each age period*

Age (years)	All Sydenham's chorea		Chorea with heart disease		Chorea without heart disease		Percentage with heart disease
	Number	Percent	Number	Percent	Number	Percent	
Under 5	18	2.6	3	1.0	15	3.8	16.7
5–9	319	46.5	141	48.8	178	44.8	44.2
10–14	297	43.3	122	42.2	175	44.1	41.1
15–19	32	4.7	15	5.2	17	4.3	46.9
20 and over	20	2.9	8	2.8	12	3.0	40.0
Age unknown	1		0		1		0
Total	687	100	289	100	398	100	42.1
Mean age	10.5		10.5		10.6		
Median age	10.1		10.0		10.2		

Percentage of Sydenham's chorea with rheumatic heart disease.—Rheumatic heart disease was diagnosed in 42.1 percent of 687 cases of Sydenham's chorea admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934 (table 9). Rheumatic heart disease was indicated in 63.3 percent of 1,324 cases of rheumatic fever (table 4). No attempt was made to subdivide chorea into "pure" and "mixed" types. During the 5–9-year age period, rheumatic heart disease was diagnosed in 44.2 percent of chorea, as compared with 41.1 percent in the 10–14-year age period, an almost equal distribution. The percentage of heart disease among these 687 cases is nearly the same as that shown in table 7, which indicates that 46.5 percent of 4,616 cases collected in the literature were reported as exhibiting clinical evidence of rheumatic heart disease.

Age of onset of Sydenham's chorea.—The clinical records of 954 patients indicated a history of Sydenham's chorea; in 650 instances the first attack occurred during an admission under study, while in

304 instances the first attack occurred prior to the beginning of this study. The age distribution by sex and color of 920 cases in which the age at onset was recorded is shown in table 10. The percentage of cases in each race and sex group is approximately the same as that shown in table 8. Females predominate; comparatively few histories of chorea were obtained from Negroes.

Table 10 and figure 6 illustrate to an even greater extent than table 8 and figure 5 that the age distribution of chorea is limited for the most part to persons under 15 years of age. According to table 10, only 5.5 percent of chorea developed among persons over 15 years of age; only 2.2 percent occurred among males, and 7.0 percent among females.

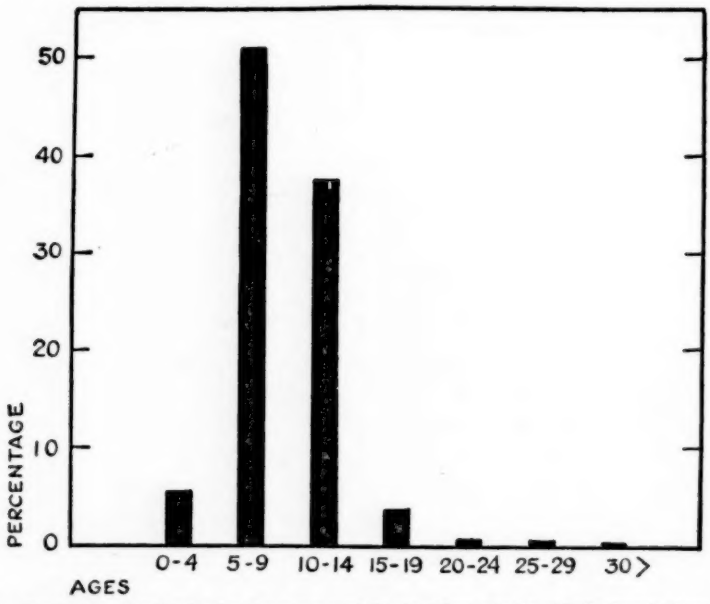

FIGURE 6.—Percentage distribution by 5-year age periods of 920 first attacks of Sydenham's chorea, with or without rheumatic heart disease, based on present or past history, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

The mean age at onset was 9.3 years, 8.6 among males, 9.7 among females. The mean age at onset among white persons was 9.3 years, among colored persons 10.3 years. The median and modal ages at onset are in close agreement with the mean.

Interrelation of chorea and rheumatic fever.—In only 41 instances were diagnoses made of rheumatic fever and Sydenham's chorea during a single admission. The fact that in only 6 percent of 687 cases of chorea was rheumatic fever found and in only 3.1 percent of 1,324 cases of rheumatic fever was chorea present during the same admission suggests the infrequency with which these diseases occur simultaneously. It is doubtful if many of these patients had both of these

conditions concurrently, since many admissions for rheumatic conditions are of several months' duration.

TABLE 10.—*Distribution by 5-year age periods, according to color and sex, of the age at onset of 920 attacks of Sydenham's chorea, with or without rheumatic heart disease, among current admissions and according to the previous histories of patients admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age (years)	Total						White						Colored			
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male (number)	Female (number)
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent		
Under 5	53	5.8	18	5.7	35	5.8	50	5.8	17	5.7	33	5.8	3	5.9	1	2
5–9	471	51.2	184	58.6	287	47.4	450	51.8	174	58.6	276	48.2	21	41.2	10	11
10–14	346	37.6	105	33.4	241	39.8	324	37.3	100	33.7	224	39.2	22	43.1	5	17
15–19	34	3.7	5	1.6	29	4.8	30	3.5	4	1.3	26	4.5	4	7.8	1	3
20 and over	16	1.8	2	.6	14	2.2	15	1.7	2	.6	13	2.3	1	2.0	0	1
Total	920	100	314	100	606	100	869	100	297	100	572	100	51	100	17	34
Percentage of total				34.1		65.9		94.5		32.3		62.2		5.5	1.8	3.7
Mean age	9.3		8.6		9.7		9.3		8.6		9.6		10.2		8.5	11.0
Median age	9.3		8.8		9.7		9.3		8.8		9.6		10.3		8.8	11.2
Modal age	9.3		9.3		9.4		9.3		9.3		9.4		10.8		9.2	11.1

Histories of previous chorea were recorded in 3.9 percent of 1,324 cases of rheumatic fever—in 5.1 percent of 838 cases with heart disease and in 1.9 percent of 486 cases without heart disease. Histories of previous chorea were mentioned in 10.6 percent of 687 cases of chorea—in 18.7 percent of 289 cases of chorea with heart disease and in 4.8 percent of 398 cases of simple Sydenham's chorea. These figures are in general agreement with the findings of Sturges (*41*), Osler (*42*), Gerstley and his associates (*50*), Stephen Mackenzie (*40*), Koplik (*47*), Starr (*60*), Abt and Levinson (*45*), Thayer (*43*), Strong (*48*), and others. In fact, most of these writers report a higher percentage of previous rheumatic involvement than the present investigation.

Ash (*14*), in a carefully conducted study, observed 153 choreic patients for an average period of 7½ years, and noted that 62.8 percent at some time suffered from articular pains. She stated, "In 15.6 percent the sequence of choreic movements and articular pains was so rapid as to make inevitable the assumption that both were manifestations of a single infection." No statement was made about the antecedent history of these conditions, owing probably to the fact that they were often seen very soon after onset.

In the opinion of the writer the rather low percentage of cases of chorea giving a history of previous rheumatic fever, and vice versa, does not necessarily militate against the view that both of these diseases are manifestations of the same underlying condition. A higher degree of association would doubtless have been found were these

cases followed for a number of years. A previous history of rheumatic fever is infrequent in Sydenham's chorea, especially without heart disease. About 15 percent of cases of rheumatic heart disease have had chorea, and about 40 percent of chorea cases exhibit unmistakable signs of rheumatic heart disease. Since the pathological picture of rheumatic heart disease in which chorea is the first or only manifestation other than cardiac involvement is the same as when rheumatic fever is the primary manifestation, it is not unreasonable to affirm the belief that both of these conditions are of rheumatic origin.

RHEUMATIC HEART DISEASE

Review of literature on history of rheumatic fever and Sydenham's chorea among cases of rheumatic heart disease.—Table 11 shows the percentage of cases of rheumatic heart disease with histories of rheumatic fever, Sydenham's chorea, or both of these conditions. In a measure, any table of this sort is only relatively accurate because of the failure of patients to remember rheumatic episodes. This applies especially to cases of rheumatic heart disease first seen in adult life. Ash (*14*), dealing only with cases followed since childhood, comments: "It is of interest that though many of these children were observed during a period when articular pain existed, often with objective evidence of swelling and tenderness, a large percentage, even within a few years of their illness, had no memory of such pains. One can readily understand the difficulty of obtaining a history of rheumatism when heart disease is first detected in adult life." Even the parents of rheumatic children often fail to recall frank attacks of rheumatic polyarthritis after a few years.

In addition to the writers (table 11) who have determined the percentage of cases of rheumatic heart disease with a history of rheumatic arthritis and chorea, a number of investigators including Kaiser (*12*), Coburn (*65*), Paul (*66*), Christie (*67*), Hart, Wood, and Daughton (*68*), and many others have indicated the importance of the role of rheumatic fever in rheumatic infection as a whole, not specifying heart disease. White (*69*) states that a history of rheumatic fever, mild or severe, can be found in about 70 percent of cases of rheumatic heart disease, and in another 5 to 10 percent a history of chorea without rheumatism is obtainable. Coombs (*6*) places the history of rheumatic arthritis at 75 percent.

TABLE 11.—*Review of literature showing percentage of rheumatic heart disease with histories of rheumatic fever and Sydenham's chorea*

Number of cases of rheumatic heart disease	Percentage with history of rheumatic fever	Percentage with history of chorea	Percentage with rheumatic fever and chorea	Source	Location	Type of patients	Author	Year	References
60			61.7	Personal observations	Bristol, England	Adults	Coombs	1924	(6)
489			86.7	Royal Hospital for Sick Children	Glasgow, Scotland	Children	Findlay	1931	(10)
258	68	28		Children's Hospital	Birmingham, Ala	do	McLean	1932	(61)
148	50.7	4.1	10.8	Peter Bent Brigham Hospital	Boston	Adults and children	Laws and Levine	1933	(62)
208	68	4.3		Louisville City Hospital	Louisville	do	Simmons	1934	(63)
224	44.4			Baylor and Parkland Hospital	Dallas	do	Winans and Dunstan	1935	(64)
445	[1] 57.7	[1] 21.3		Children's Hospital	Philadelphia	Children	Ash	1936	(14)
688			62.6	Mt. Sinai Hospital	New York	do	Roth, Lingg, and Whittemore.	1937	(17)

[1] Primary manifestations.

Age, race, and sex of 3,654 cases of rheumatic heart disease.—The age, race, and sex distribution of 3,654 cases of rheumatic heart disease, including 209 cases of subacute bacterial endocarditis superimposed on rheumatic heart disease (table 1) is shown in table 12. This table and figure 7 indicate that despite the fact that rheumatic heart disease at all ages is included in this study, it is still predominantly a problem of youth and early adult life. Only 2.7 percent of admissions were indicated among persons under 5 years of age. This is in agreement with the common observation that rheumatic fever is relatively infrequent in children under 5 years. The greatest occurrence, 17.5 percent, is indicated in the 5–9-year age group, although nearly as many, 17.1 percent, were admitted during the age period 10–14 years. During the 15–19-year age period, 10.5 percent were admitted. Al-

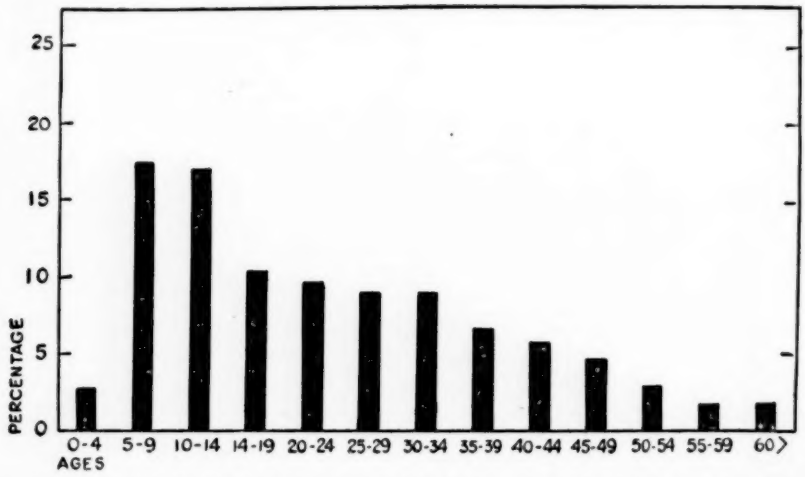

FIGURE 7.—Percentage distribution by 5-year age periods of 3,654 cases of rheumatic heart disease, based on age at initial admission during period under study, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

together, nearly half of the admissions (47.8 percent) occurred among persons under 20 years of age. After that age the percentage of admissions was progressively smaller, except during the 25–29 and 30–34-year age periods in each of which 9.1 percent of admissions occurred. Only 17.3 percent of admissions involving rheumatic heart disease were among persons over 40, and only 1.9 percent among persons over 60 years of age. These figures are a clear indication of the fact that rheumatic heart disease is not a problem of the aged, but rather of youth and early adult life.

In contradistinction to rheumatic fever, in which the distribution of initial admissions during the period under study was approximately equal on the basis of sex (table 3), 58.6 percent of rheumatic heart disease occurred among females and only 41.4 percent among

males. This is in agreement with the concensus of most investigators that rheumatic heart disease is somewhat more common among females. A greater number among females was indicated in every age period except 15–19 years in which it was about equally distributed. Except for a slightly greater percentage of males under 20 years the age distribution was essentially the same. The peak of occurrence among males was in the 5–9-year age group, among females in the 10–14-year period.

Only 13.3 percent occurred among colored persons. Although this is in proportion to the size of the colored population of Philadelphia, it suggests that rheumatic heart disease is less common than among white persons. Owing to their less favorable economic circumstances Negroes are more likely to be hospitalized. Nearly 50 percent of the colored population is on relief; the remainder are, for the most part, unable to provide medical treatment for a protracted and catastrophic illness such as rheumatic heart disease.

The age distribution of the colored population may account in part for the lower frequency, even among hospital patients. During the decade between 1920 and 1930 the colored population of Philadelphia increased 69 percent, owing largely to the migration of young adults from the South. Most of these persons are not now in the age period in which rheumatic heart disease is most common. Furthermore, it is not unlikely that there was less migration among persons with serious handicaps, as most of them came North seeking employment. Offsetting this possibility is the fact that the age distribution of rheumatic heart disease in hospitals was in comparable agreement with the age distribution among white persons. Among both colored males and females the greatest occurrence was noted during the 10–14-year age period.

The mean age of initial admissions during the period under study was 24.2 years, lower by more than 5 years than the mean age at death. The mean ages were approximately the same in each race and sex group. The median age was 21.1 years, and was slightly higher among females than males. The mode was 9.3 years—9.3 among males and 11.8 among females. The modal age was slightly lower among white persons than Negroes.

TABLE 12.—*Age distribution, in 5-year groups, according to race and sex of 3,654 cases of rheumatic heart disease admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on age at initial admission during the period under study*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	99	2.7	46	3.1	53	2.5	88	2.8	42	3.2	46	2.5	11	2.3	4	2.1	7	2.4
5–9	637	17.5	298	19.8	339	15.9	565	17.9	268	20.5	297	16.1	72	14.9	30	15.4	42	14.6
10–14	624	17.1	265	17.6	359	16.8	528	16.7	221	16.9	307	16.6	96	19.9	44	22.6	52	18.1
15–19	383	10.5	193	12.8	190	8.9	336	10.6	173	13.2	163	8.8	47	9.7	20	10.3	27	9.4
20–24	357	9.8	127	8.4	230	10.8	299	9.5	105	8.0	194	10.5	58	12.0	22	11.3	36	12.5
25–29	331	9.1	121	8.0	210	9.8	280	8.9	103	7.9	177	9.6	51	10.6	18	9.2	33	11.5
30–34	333	9.1	125	8.3	208	9.7	279	8.8	104	7.9	175	9.5	54	11.2	21	10.8	33	11.5
35–39	249	6.8	86	5.7	163	7.6	227	7.2	78	6.0	149	8.1	22	4.6	8	4.1	14	4.9
40–44	216	5.9	71	4.7	145	6.8	192	6.1	64	4.9	128	6.9	24	5.0	7	3.6	17	5.9
45–49	171	4.7	74	4.9	97	4.5	150	4.7	65	5.0	85	4.6	21	4.3	9	4.6	12	4.2
50–54	108	3.0	39	2.6	69	3.2	96	3.0	34	2.6	62	3.4	12	2.5	5	2.6	7	2.4
55–59	65	1.8	28	1.9	37	1.7	58	1.8	26	2.0	32	1.7	7	1.4	2	1.0	5	1.7
60 and over	68	1.9	32	2.1	36	1.7	60	1.9	27	2.1	33	1.8	8	1.7	5	2.6	3	1.0
Unknown	13		6		7		12		5		7		1		1		0	
Total	3,654	100	1,511	100	2,143	100	3,170	100	1,315	100	1,855	100	484	100	196	100	288	100
Percentage of total				41.4		58.6		86.7		36.0		50.7		13.3		5.4		7.9
Mean age	24.2		23.2		24.9		24.3		23.1		25.1		23.7		23.3		24.0	
Median age	21.1		18.7		22.8		21.0		18.6		22.9		21.3		19.9		22.2	
Modal age	9.3		9.3		11.8		9.3		9.2		11.8		12.0		12.0		12.0	

Age distribution, according to race and sex, at onset of 2,195 cases of rheumatic heart disease.—The age at onset was recorded in the clinical histories of 2,195 of 3,654 cases. These included 616 instances in which onset of rheumatic heart disease occurred about the time of the initial admission in the period under study, and 1,579 in which an onset at an earlier age was indicated.

According to table 13 and figure 8, 6.6 percent admitted onset of rheumatic heart disease under 5 years of age. The peak occurrence of onset, 27.7 percent, was indicated in the 5–9-year age period. Nearly as many, 23.5 percent, began during the 10–14-year age period. Onset of rheumatic heart disease was indicated in 11.3 percent of cases during the 15–19-year age period. A progressively smaller

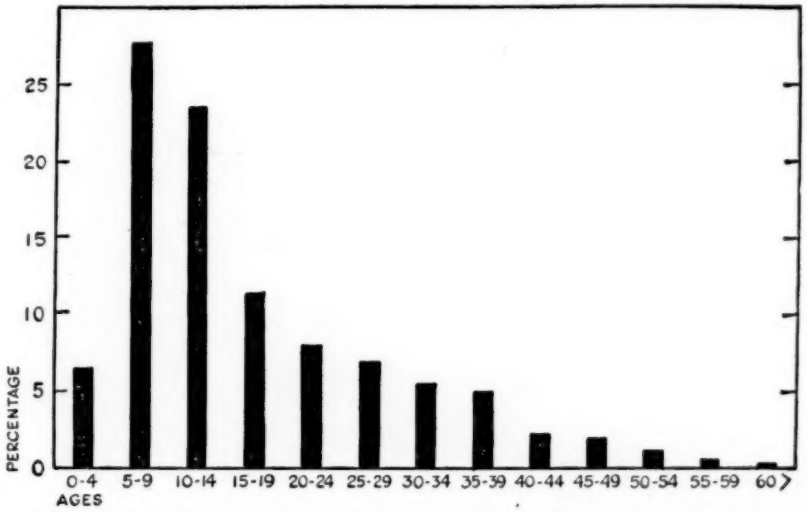

FIGURE 8.—Percentage distribution by 5-year age periods of onset of 2,195 cases of rheumatic heart disease, based on present or past histories, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

percentage for onset of rheumatic heart disease was noted in each subsequent 5-year period.

With the exception that a slightly greater percentage of males than females and of white persons than Negroes developed rheumatic heart disease prior to age 20, the age distribution was essentially similar in each race and sex group. The mean age at onset was 16.0 years, the median age was 13.3 years, and the modal 8.9 years. Only slight differences are noted on the basis of color and sex. These figures are in close agreement with the mean, median, and modal ages of 2,539 first attacks of rheumatic fever (table 5).

TABLE 13.—*Age distribution by 5-year groups, according to race and sex, at onset of heart disease of 2,195 cases of rheumatic heart disease according to history of patient among 3,654 cases of rheumatic heart disease admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age (years)	Total						White						Colored					
	Both sexes		Male		Female		Both sexes		Male		Female		Both sexes		Male		Female	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	144	6.6	64	6.7	80	6.5	129	6.8	56	6.7	73	6.8	15	5.2	8	6.3	7	4.3
5–9	609	27.7	283	29.5	326	26.4	535	28.1	252	30.3	283	26.4	74	25.5	31	24.6	43	26.2
10–14	515	23.5	235	24.5	280	22.6	456	23.9	211	25.4	245	22.8	59	20.3	24	19.0	35	21.3
15–19	247	11.3	120	12.5	127	10.3	209	11.0	98	11.8	111	10.3	38	13.1	22	17.5	16	9.8
20–24	176	8.0	54	5.6	122	9.9	150	7.9	43	5.2	107	10.0	26	9.0	11	8.7	15	9.1
25–29	151	6.9	62	6.5	89	7.2	126	6.6	54	6.5	72	6.7	25	8.6	8	6.3	17	10.4
30–34	120	5.5	52	5.4	68	5.5	97	5.1	42	5.0	55	5.1	23	7.9	10	7.9	13	7.9
35–39	107	4.9	30	3.1	77	6.2	95	5.0	26	3.1	69	6.4	12	4.1	4	3.2	8	4.9
40–44	49	2.2	22	2.3	27	2.2	41	2.2	18	2.2	23	2.1	8	2.8	4	3.2	4	2.4
45–49	41	1.9	20	2.1	21	1.7	35	1.8	18	2.2	17	1.6	6	2.1	2	1.6	4	2.4
50–54	24	1.1	10	1.0	14	1.1	21	1.1	9	1.1	12	1.1	3	1.0	1	.8	2	1.2
55–59	9	.4	4	.4	5	.4	9	.5	4	.5	5	.5	0	0	0	0	0	0
60 and over	3	.1	2	.2	1	.1	2	.1	1	.1	1	.1	1	.3	1	.8	0	0
Total	2,195	100	958	100	1,237	100	1,905	100	832	100	1,073	100	290	100	126	100	164	100
Percentage of total				43.6		56.4		86.8		37.9		48.9		13.2		5.7		7.5
Mean age	16.0		16.0		17.1		16.4		15.8		17.0		17.6		17.3		17.8	
Median age	13.3		12.8		13.8		13.2		12.6		13.7		14.7		15.0		14.6	
Modal age	8.9		8.9		8.9		8.9		9.0		8.9		9.0		8.8		9.2	

Cumulative percentage of age at onset of rheumatic heart disease.—Onset prior to age 5 was indicated in 6.6 percent of 2,195 cases of rheumatic heart disease (fig. 9 and table 13). In over a third (34.3 percent) the onset of rheumatic heart disease occurred before age 10, in well over a half (57.8 percent) prior to age 15, in over two-thirds (69.1 percent) prior to age 20, in over three-fourths (77.1 percent) prior to age 25, in 84 percent prior to age 30, in nearly 90 percent before age 35, and in nearly 95 percent among persons younger than 40 years. The clinical inception of only 5.7 percent of rheumatic heart disease developed in persons past 40.

This is probably an understatement of the actual cumulative percentage of the onset of rheumatic heart disease in childhood, youth, early and middle adult life. Rheumatic heart disease often develops

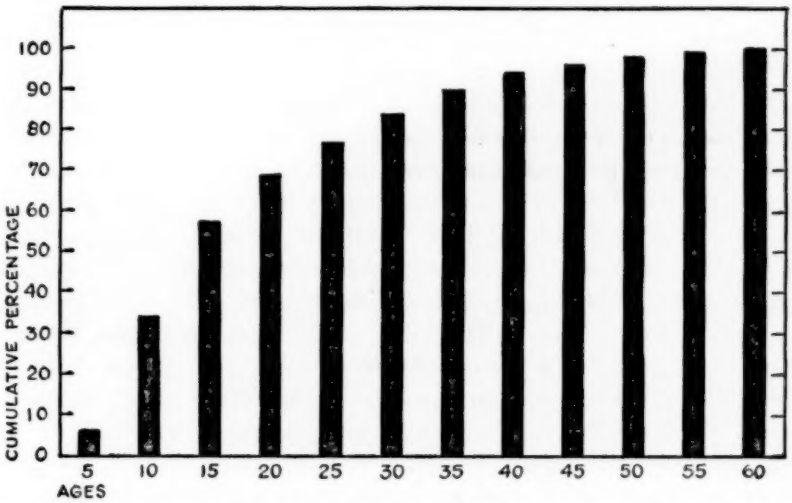

FIGURE 9.—Cumulative percentage by 5-year periods of onset of 2,195 cases of rheumatic heart disease, based on past or present histories, among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

years before the patient is cognizant of its existence. It usually begins with an attack of rheumatic fever or chorea during childhood. It may, however, be initiated during a recurrence of these conditions, or during a recurrence or exacerbation of rheumatic infection unattended by choreiform or arthritic manifestations. Sometimes it apparently begins insidiously following an attack of these diseases. It may also develop insidiously in persons who have never exhibited clinical manifestations of rheumatic fever or chorea. Sometimes the onset of rheumatic heart disease actually antedates attacks of these conditions. Not infrequently rheumatic heart disease is first detected in an apparently healthy individual during a physical examination for life insurance, employment, or military service. In other instances

rheumatic heart disease is not recognized until it becomes a severe handicap, or is even incapacitating.

Percentage of rheumatic heart disease with history of rheumatic fever or Sydenham's chorea.—Of the 3,654 cases of rheumatic heart disease, 2,248, or 61.5 percent, gave a previous history of rheumatic fever or had clinical manifestations during an admission under study. Similarly, evidence of chorea was obtained in 556 cases, or 15.2 percent. Of these 556 cases with a previous or current history of chorea, 138 also had a history of rheumatic fever. Consequently, a history of Sydenham's chorea without rheumatic fever was indicated in 418, or 11.4 percent. A present or previous history of rheumatic fever, Sydenham's chorea, or both of these conditions was indicated in 2,656 instances, or 72.7 percent. This percentage is in reasonable accord with the findings of a number of writers, as shown in table 11.

Percentage of rheumatic fever among admissions involving rheumatic heart disease.—Clinical manifestations of rheumatic fever were exhibited among 838 of 3,654 initial admissions involving rheumatic heart disease during the period under study. According to table 14, the percentage of rheumatic fever among cases of rheumatic heart disease tends to become less with advancing years. Among the cases under age 20, 31.7 percent had rheumatic fever. The greatest percentage was indicated in children under 5 years of age, 43.4 percent of these cases of rheumatic heart disease being diagnosed as having rheumatic fever. This is only to be expected since most cases admitted during that age period are for severe primary manifestations, or recrudescences or recurrences of rheumatic infection, often with signs of rheumatism. With each succeeding 5-year period more patients are probably admitted for conditions caused by the cumulative effects of long-standing rheumatic heart disease.

TABLE 14.—*Age distribution, by 5-year groups, of rheumatic fever among 3,654 cases of rheumatic heart disease admitted to Philadelphia hospitals from January 1, 1930, to December 31, 1934*

Age (years)	Total rheumatic heart disease	Rheumatic heart disease with rheumatic fever	Percent with rheumatic fever	Age (years)	Total rheumatic heart disease	Rheumatic heart disease with rheumatic fever	Percent with rheumatic fever
Under 5	99	43	43.4	40–44	216	26	12.0
5–9	637	190	29.8	45–49	171	14	8.2
10–14	624	193	30.9	50–54	108	12	11.1
15–19	383	126	32.9	55–59	65	2	3.1
20–24	357	88	24.6	60 and over	68	3	4.4
25–29	331	67	20.2	Unknown	13	2	15.4
30–34	333	52	15.6				
35–39	249	20	8.0	Total	3,654	838	22.9

Estimated percentage of rheumatic activity according to 5-year age periods.—Efforts were made to estimate the percentage of cases of active rheumatic infection in each age period among 3,446 cases of rheumatic heart disease uncomplicated by subacute bacterial endocarditis. The relation of rheumatic activity to subacute bacterial endocarditis is a moot question, and is often impossible to determine in clinical cases, much less in a review of hospital records.

Fortunately, a number of hospitals in Philadelphia use the American Heart Association nomenclature (*23*), which provides for the diagnosis of active and inactive rheumatic heart disease. In other instances it was necessary to review the clinical records for evidence of rheumatic activity. All cases of rheumatic heart disease associated with rheumatic fever or chorea were considered as manifesting signs of

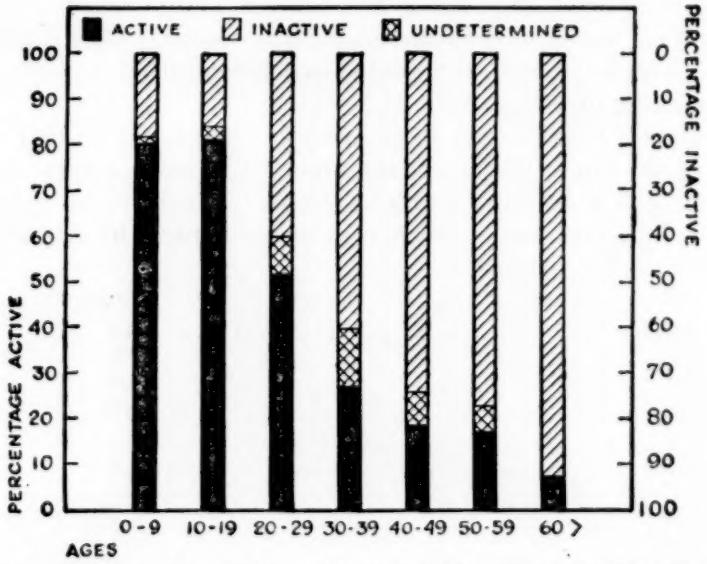

FIGURE 10.—Percentage of 3,446 cases of rheumatic heart disease, exclusive of subacute bacterial endocarditis, by age decades, regarded as having signs of activity of rheumatic infection among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

active rheumatic infection. Most cases admitted in close sequence to an attack of rheumatic fever or chorea, and which exhibited clinical and laboratory signs of infection such as fever, leucocytosis, increased sedimentation rates, epistaxis, and other signs of infection, were regarded as manifesting signs of active rheumatic infection. Cases without a recent history of rheumatic fever or chorea with signs of infection, not otherwise accounted for, were regarded as having rheumatic activity.

Of these 3,446 cases of rheumatic heart disease (fig. 10) uncomplicated by subacute bacterial endocarditis, 56.4 percent were regarded as showing signs of rheumatic infection. Excluding a relatively

small number of cases in which no estimate of activity of rheumatic infection was made, 59.3 percent were considered as having evidence of rheumatic activity.

Over 80 percent of cases under age 20 were regarded as having active rheumatic heart disease. This is probably no greater because a number of admissions to general and children's hospitals were made prior to transfer to the Children's Heart Hospital, which requires a 2 weeks' period of observation to prevent the introduction of communicable diseases and to obtain certain laboratory studies. Many of these patients do not exhibit signs of rheumatic activity during their short stay in a general hospital and are admitted to the Children's Heart Hospital because they have had a rheumatic episode in the recent past, are underweight, or because of poor home conditions.

In persons over 20 years of age, a lower percentage of rheumatic activity was noted in each succeeding age decade. Only 7.2 percent of cases over 60 years were regarded as demonstrating signs of activity of rheumatic infection.

Rheumatic heart disease in pregnancy.—One hundred and sixteen cases of rheumatic heart disease among pregnant women were recorded. These involved 129 admissions. Based on the age at the initial admission during the period under study, the following age distribution was indicated:

Age (years)	*Number*	*Percentage*
15–19	11	9.5
20–24	33	28.4
25–29	32	27.6
30–34	18	15.5
35–39	16	13.8
40–44	6	5.2
Total	116	100.0

The mean age was 28.2 years.

One hundred and six of the women were white and 10 were colored. Twenty had Caesarian sections, 11 therapeutic abortions, 2 simple sterilization operations, 6 threatened or inevitable abortions, 3 toxemias of pregnancy, 10 had a number of miscellaneous complications, 7 were discharged before delivery, and 57 apparently had entirely normal deliveries. Twenty-one died during pregnancy or the puerperium. The causes of these deaths will be studied in detail in the third of this series of articles, which consists of an analysis of fatal cases of rheumatic heart disease in Philadelphia hospitals during 1930–34.

SUBACUTE BACTERIAL ENDOCARDITIS

Review of the literature on the relationship of rheumatic fever and rheumatic heart disease to subacute bacterial endocarditis.—The percentage

of subacute bacterial endocarditis with a history of rheumatic fever and Sydenham's chorea, and the percentage exhibiting clinical or necropsy manifestations of rheumatic heart disease, based on a number of investigations, is shown in table 15. Most of the clinical diagnoses of antecedent rheumatic cardiac involvement are based on a history of pre-existing valvular disease of the rheumatic type, usually acquired during childhood or youth. Several of these writers comment upon the difficulties attending diagnosis, solely on the basis of physical findings, of subacute bacterial endocarditis superimposed on rheumatic heart disease. With the exception of the study by Horder (*72*), which is reasonably comparable, all are made on diagnoses of subacute bacterial endocarditis. Horder, who uses the designation "infective endocarditis," made his study in 1908 before the term "subacute bacterial endocarditis" came into common usage to describe what is now a well-recognized clinical entity.

Of the 310 cases of subacute bacterial endocarditis in this collected series studied post mortem in which an inquiry was made about antecedent rheumatic infection, a positive history of rheumatic fever or chorea was obtained in 50.9 percent. Of 472 cases examined post mortem, 62.1 percent exhibited lesions which were considered characteristic of rheumatic heart disease. A history of rheumatic fever or chorea was obtained in 51.9 percent of 770 cases of subacute bacterial endocarditis in which a clinical diagnosis was made, while 63.8 percent were regarded as having a pre-existing rheumatic cardiac lesion.

Percentage of subacute bacterial endocarditis with rheumatic basis.— Of the 324 cases of subacute bacterial endocarditis (table 1) 209, or 64.5 percent, were considered as having a rheumatic basis, while 115, or 35.5 percent, were either superimposed on other types of heart disease or were apparently instances of "primary" subacute bacterial endocarditis. This indicates that subacute bacterial endocarditis is predominantly a complication of rheumatic heart disease; measures to reduce the incidence of rheumatic fever would doubtless be reflected in a reduction of this almost invariably fatal disease.

Of the 209 cases of subactute bacterial endocarditis apparently engrafted on rheumatic heart disease, necropsies were obtained in 81 instances. Among the cases examined post mortem a previous history of rheumatic fever or chorea was indicated in 55, or 67.9 percent. There were only 3 with histories of chorea, all of which also gave a history of rheumatic fever. In 5 instances there was a history of acquired heart disease dating back many years. In 21 cases, or 25.9 percent, a rheumatic implication was made solely on the basis of necropsy findings.

TABLE 15.—*Percentage of subacute bacterial endocarditis indicated by a number of writers as having a history of rheumatic fever or chorea, or signs of pre-existing rheumatic heart disease*

Designation	Number of cases	Percentage with history of rheumatic fever or chorea	Percentage with signs of rheumatic heart disease	Basis of diagnosis	Author	Source	Location	Reference
Subacute bacterial endocarditis	37	51	60	Necropsy	Brink and Smith	Mayo Clinic	Rochester, Minn	(70)
Do	47		74	do	Davis and Weiss	Boston City Hospital	Boston	(71)
Infective endocarditis	114		80	do	Horder	Several sources	London	(72)
Do	150	48		Clinical	do	do	do	(72)
Subacute bacterial endocarditis	26		81	Necropsy	Thayer	Johns Hopkins Hospital	Baltimore	(73)
Do	25	60		do	do	do	do	(73)
Do	150	45	38	do	Blumer	Personal observations and literature.		(74)
Do	330	50		Clinical	do	do		(74)
Do	111		45	do	Fulton and Levine	Peter Bent Brigham Hospital	Boston	(75)
Do	145	Over 50		do	Morrison	Massachusetts General Hospital	do	(76)
Do	72	50	57	Necropsy	Clawson	University of Minnesota	Minneapolis	(77)
Do	26	79	100	do	Van Glahn and Pappenheimer.	Presbyterian Columbia Hospital	New York	(78)
Do	115	60	82	Clinical	do	do	do	(78)
Do	30	70		do	Bierring	Personal observations	Des Moines	(79)

In 128 cases of subacute bacterial endocarditis, the diagnosis of rheumatic involvement was made on the basis of clinical studies. A history of rheumatic fever or chorea, usually years prior to the admission under study, was indicated in 97, or 75.8 percent. Only 7 gave histories of chorea; 4 also had rheumatic fever. In 24 instances, or 18.8 percent, a history of acquired heart disease, apparently of the rheumatic type, was recorded. In 3 others there was a history of scarlet fever, a condition which occasionally results in heart disease of the rheumatic type. In 3 other cases there appeared to be almost indisputable evidence of mitral stenosis, a lesion that is almost always due to rheumatic cardiac involvement. In these cases the condition was regarded by the attending and consulting physicians as having a rheumatic basis.

The diagnoses of 37 of the 115 cases of subacute bacterial endocarditis in which a relationship to rheumatic heart disease was not evident were either made or sustained by post-mortem examinations. In 5 of these 37 cases subacute bacterial endocarditis was engrafted upon a congenital cardiac malformation. There was one apparently proved case of subacute bacterial endocarditis superimposed on syphilitic aortic insufficiency, while in another it was strongly suggested. In the other 30 cases necropsy failed to reveal any definite cardiac abnormality upon which subacute bacterial endocarditis was implanted. Apparently a number were instances of the "primary" or idiopathic type.

It should be borne in mind that, even as a result of post-mortem studies, it is sometimes extremely difficult to detect with reasonable certainty rheumatic involvement of valves which have been almost destroyed or severely distorted because of subacute bacterial endocarditis. This condition is more likely to attack valves slightly impaired from rheumatic involvement than extremely stenosed valves. As a result, it is probable that morbid changes arising from old rheumatic heart disease are frequently not recognized in post-mortem studies of subacute bacterial endocarditis.

In 78 cases of subacute bacterial endocarditis, in which a relationship to rheumatic heart disease was not satisfactorily determined, the diagnosis was made on the basis of clinical studies. In 6 cases congenital malformations apparently served as a nidus for the superimposition of bacterial endocarditis; in 2 instances infective endocarditis was probably engrafted upon lesions of cardiovascular syphilis. In the other 70 no primary focus was determined; in some, however, a rheumatic basis was strongly suggested.

The extreme infrequency of subacute bacterial endocarditis as a complication of syphilitic aortitis, even aortic insufficiency, is in sharp contrast to its frequency as a complication of rheumatic heart disease. This relative rarity has been commented upon by a number of writers

including Cotton (*80*), Martin and Adams (*81*), McMillan and Wilbur (*82*), Briggs (*83*), White (*69*), and others. Martin and Adams reported 157 cases of vegetative endocarditis among 17,000 necropsies at the Los Angeles County Hospital. Of these there were only 5 cases in which vegetative endocarditis was associated with syphilitic aortitis or valvulitis.

Age, race, and sex distribution of subacute bacterial endocarditis.—Of the 324 cases of subacute bacterial endocarditis, 288 are known to have terminated fatally. Of the other 36 cases, 15 were not residents of Philadelphia and could not be followed up. Judging from the clinical records, it is doubtful if any of these 36 cases recovered. The age,

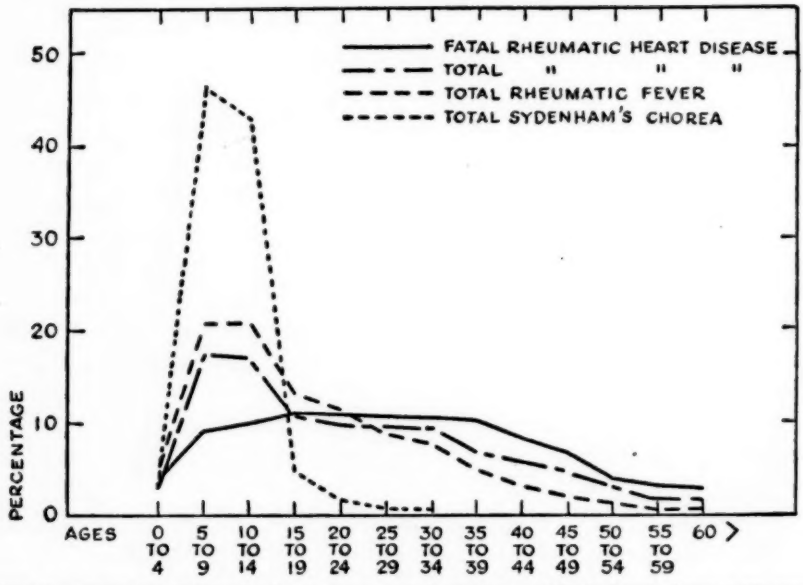

FIGURE 11.—Percentage distribution by 5-year age periods of 687 cases of Sydenham's chorea, 1,324 cases of rheumatic fever, 3,654 cases of rheumatic heart disease, and 916 fatal cases of rheumatic heart disease among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

race, and sex distribution of the 288 fatal cases will be discussed in Part III of this series of articles.

RECAPITULATION OF AGE DISTRIBUTION OF RHEUMATIC CONDITIONS

By way of recapitulation, two figures have been prepared showing the age distribution and cumulative percentage of major rheumatic manifestations.

Figure 11 indicates that Sydenham's chorea is almost exclusively a problem of the 5–14-year age period. Rheumatic fever and rheumatic heart disease have a much wider age distribution but are still predominantly diseases of childhood, adolescence, and early adult life. In both of these conditions the peak occurrence of admissions is in the

5–9-year age period, with nearly as many in the 10–14-year age group. Only a small percentage of admissions occurs after age 50. The age distribution of fatal cases by 5-year periods indicates an almost equal distribution during the 7 hemidecades 5 to 39 years, with a slightly higher percentage in the 15–19-year period. Comparatively few deaths occur after 50 years of age; very few after 60 years.

Figure 12 shows the cumulative percentages of the onset of rheumatic fever, the onset of rheumatic heart disease, admissions for rheumatic heart disease, and fatal rheumatic heart disease. Since the age distribution of chorea is so largely confined to the 5–14-year period, it is not included. This figure indicates at a glance the

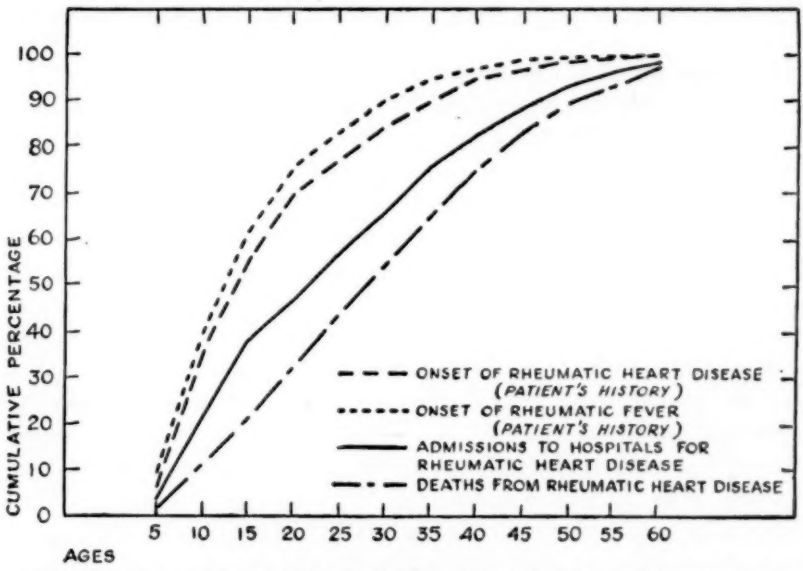

FIGURE 12.—Cumulative percentage by 5-year age periods of onset of 2,539 cases of rheumatic fever, onset of 2,195 cases of rheumatic heart disease, 3,654 cases of rheumatic heart disease (age at admission) and 916 fatal cases of rheumatic heart disease among admissions to Philadelphia hospitals from January 1, 1930, to December 31, 1934.

importance of rheumatic conditions as a problem of childhood, youth, and young adult life. To reiterate, the onset of over 75 percent of rheumatic fever and nearly 70 percent of rheumatic heart disease, nearly 50 percent of admissions for rheumatic heart disease, and over 30 percent of deaths from rheumatic heart disease occur before 20 years of age.

SUMMARY

An analysis has been made of the age, race, and sex distribution of rheumatic fever, Sydenham's chorea, and rheumatic heart disease in Philadelphia hospitals from January 1, 1930, to December 31, 1934, based on the age at initial admission during the period under study and the age at onset as indicated in the clinical histories. In some

cases the onset occurred during stay in hospital; in other instances it was determined by review of patients' past histories. Figures have been prepared showing the age distribution and cumulative percentages by 5-year age periods of a number of important rheumatic manifestations.

The literature has been reviewed and tables prepared showing the association of rheumatic fever and clinical manifestations of rheumatic heart disease, the age at onset of rheumatic infections, the percentage of Sydenham's chorea presenting clinical evidence of rheumatic heart disease, the percentage of rheumatic heart disease with histories of rheumatic fever and Sydenham's chorea, and the percentage of subacute bacterial endocarditis superimposed on rheumatic heart disease.

The importance of rheumatic heart disease as a problem of childhood and youth is emphasized by the fact that the onset of 76.4 percent of rheumatic fever, 98.2 percent of chorea, and 69.1 percent of rheumatic heart disease occurred before age 20. The mode of the age of onset of rheumatic fever was 8.7 years, of Sydenham's chorea 9.3 years, and of rheumatic heart disease 8.9 years. Of the initial admissions during the period under study (not necessarily the first admissions for these conditions), 59.6 percent of rheumatic fever, 97.1 percent of Sydenham's chorea, and 47.8 percent of rheumatic heart disease occurred among persons under 20 years of age. Despite the fact that this is the first study on a large scale of the major rheumatic manifestations at all ages, the peak of onset of rheumatic fever, Sydenham's chorea, and rheumatic heart disease occurred in the 5–9-year age period.

The expression "juvenile rheumatism" is regarded as an inappropriate description of a disease which begins for the most part during childhood, but is characterized by chronicity, exacerbations, and recurrences throughout adult life. Although essentially a problem of childhood and youth, attacks of rheumatic fever may occur at almost any age.

In only 2.7 percent of cases of rheumatic fever and 5.7 percent of cases of rheumatic heart disease did the onset occur after age 40. Rheumatic heart disease is decidedly infrequent among hospital patients over 60 years of age. Unlike many other types of heart disease, rheumatic heart disease is not a problem of great importance among persons past middle age.

Rheumatic fever, Sydenham's chorea, and rheumatic heart disease are relatively uncommon under 5 years of age. Very few cases of rheumatic fever under age 2 were admitted, and comparatively few previous histories indicated the onset of rheumatic infection in infancy.

Approximately the same number of males as females were admitted for rheumatic fever; slightly more females than males gave histories

of rheumatic fever. The distribution of rheumatic heart disease according to sex indicated a slightly greater percentage of females. Sydenham's chorea was nearly twice as common among females.

Rheumatic fever and rheumatic heart disease were less common among Negroes than might be expected, considering their unfavorable economic circumstances as a result of which they are more likely to be hospitalized. A considerably greater percentage of first attacks of rheumatic fever was indicated among colored persons in the 20–39-year age period. Sydenham's chorea was relatively uncommon among Negroes. The possibility is suggested that rheumatic heart disease is more likely to develop in association with chorea among colored persons.

The clinical records of 63.3 percent of 1,324 cases of rheumatic fever indicated diagnoses of rheumatic heart disease. The percentage of rheumatic fever with heart disease was greatest among persons under age 20.

Of the 3,654 cases of rheumatic heart disease, 61.5 percent gave histories or exhibited clinical manifestations of rheumatic fever. Sydenham's chorea, with or without rheumatic fever, was indicated in 15.2 percent of rheumatic heart disease. Excluding the cases of chorea which also gave histories or presented clinical evidence of rheumatic fever, 11.4 percent of the cases of rheumatic heart disease gave histories of having had chorea without frank attacks of rheumatic fever. Altogether, 72.7 percent of rheumatic heart disease gave histories or exhibited clinical manifestations of rheumatic fever, Sydenham's chorea, or both of these conditions.

Diagnoses of rheumatic heart disease were indicated in 42.1 percent of Sydenham's chorea. This percentage would probably have been higher had these cases been followed after discharge from hospital. These studies and the results of a number of other investigations indicate that a child with almost any form of Sydenham's chorea stands a much greater chance of developing rheumatic heart disease than a child who has never had any form of Sydenham's chorea. This, together with the fact that 10 to 15 percent of cases of rheumatic heart disease give histories of chorea, many without frank attacks of rheumatic fever, suggests that Sydenham's chorea should continue to be regarded as a manifestation of the rheumatic state.

The importance of activity of rheumatic infection is suggested by the fact that 56.4 percent of 3,446 cases of rheumatic heart disease uncomplicated by subacute bacterial endocarditis were regarded as presenting signs of rheumatic activity. This is probably an underestimate. Over 80 percent of cases under age 20 were considered as having active rheumatic infection. Of the 3,654 cases of rheumatic heart disease, including subacute bacterial endocarditis when occurring as a complication, 22.9 percent presented clinical manifestations of

rheumatic arthritis. The percentage of rheumatic heart disease with rheumatic fever was greater among cases under 20 years of age.

Among 324 cases of subacute bacterial endocarditis, 64.5 percent were regarded as superimposed on rheumatic heart disease. Comment is made on the infrequency of subacute bacterial endocarditis as a complication of cardiovascular syphilis.

Comment is made upon the discrepancy in the age distribution of clinical diagnoses of rheumatic fever in hospitals, most of which are either approved for interneship by the American Medical Association or are accredited children's hospitals, and the age distribution of deaths attributed by physicians to rheumatic fever, as indicated by mortality statistics obtained from the local office of vital statistics. This suggests the inadvisability of making rheumatic fever at all ages a notifiable disease. Measures directed toward combating this problem should be concentrated on persons under 20 years of age, the period in which most cases develop.

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APPENDICITIS CAUSES FAR TOO MANY DEATHS *

What are the facts?—Deaths from appendicitis in the United States increased from 7,371 in 1900 to over 18,000 in 1930. Although the number of deaths has fallen off since then, it is estimated that about 14,000 people died from this disease in 1939. In 1937, the last year for which reliable information is available, the United States had the second highest death rate from appendicitis in the world. The disease strikes persons of both sexes, and at all ages; neither infants nor old people are spared.

Surely, any disease which causes this many deaths each year is a matter of vital public concern. Appendicitis cannot be prevented, but within certain definite limitations few deaths, if any, need result from this disease.

What is appendicitis?—This disease, the exact cause of which is not known, is an inflammation of the appendix, a dead-end part of the large intestine, about the size of the little finger, located in the lower right quarter of the abdomen.

What to look for in appendicitis.—Persistent pain in the abdomen is the usual early symptom. It begins suddenly and is dull and constant. At first, pain is apt to be in the pit of the stomach. Later, it becomes sharp and cramp-like in the lower right side of the abdomen. The patient usually feels nauseated and may vomit.

If the sharp pain stops suddenly, the appendix has probably burst. This is an exceedingly dangerous sign. If a doctor has not been called already, do not delay another moment. The chances of recovery depend almost entirely on the speed with which medical and surgical care are obtained.

Why do people die of appendicitis?—Death from appendicitis results from poisons that seep from the inflamed appendix into other parts

* This material is available in leaflet form and a limited number of copies may be obtained by addressing the Surgeon General, U. S. Public Health Service, Washington, D. C.

of the abdomen, or that spread rapidly when the appendix bursts. The inside of the abdomen is covered by a thin film-like tissue (the peritoneum) somewhat like the lining of the inside of the mouth. When more than one-half of the surface of this tissue becomes infected (peritonitis) by the poisons from the appendix, the patient dies. It is well to remember that people do not die of appendicitis itself, but from the spread of the infection.

What is the treatment?—There is no medical cure for appendicitis. The most effective treatment for this disease is early and prompt removal of the inflamed appendix. It is much better to sacrifice an appendix in a timely operation than to lose a human life by delay. Physicians agree that if the operation is performed in time, no one need die of appendicitis, and there is little or no danger from the operation itself. The patient and his family have nothing to fear except the possible bad results of their own delay.

While there is no way to prevent appendicitis, one sure way of avoiding the hazards of this disease is to have the appendix removed. This is suggested especially to those who contemplate taking long trips by sea or land, during which they will be far removed from hospital facilities.

Can deaths from appendicitis be prevented?—The chief danger from appendicitis results from self-doctoring and from delay in calling a doctor. Remember that pain in the abdomen which lasts more than 3 hours is likely to be due to appendicitis, but whether the appendix or some other organ is to blame, such persistence of pain demands that medical opinion be secured. Every year thousands of people suffering from abdominal pain gamble with their lives by dosing themselves with laxatives—the Nation's cure-all—or by taking enemas. The first rule in dealing with appendicitis is to call a physician. The second is to avoid any strain on the large intestine which will cause the diseased appendix to burst. This means, *no laxatives, no enemas.*

Appendicitis will disappear from the list of "killers" if the public will cooperate with the medical profession and follow these four simple rules:

1. Consider any abdominal pain as a dangerous sign.
2. When there is abdominal pain, do not take a laxative, drug, or enema.
3. If pain lasts more than 2 to 3 hours, call a physician. If pain is severe, call a doctor at once.
4. Until the physician arrives, apply an ice bag or other cold application over the painful area in the abdomen.

DO NOT INDULGE IN SELF-DIAGNOSIS OR SELF-TREATMENT. CONSULT YOUR DOCTOR

COURT DECISION ON PUBLIC HEALTH

City health department held without power to make regulations inconsistent with State law and regulations.—(New York Court of Appeals; *S. H. Kress & Co.* v. *Department of Health of City of New York*, 27 N.E.2d 431; decided April 26, 1940.) By statute the State of New York had set up a complete and comprehensive scheme for controlling the manufacture and sale of frozen desserts, which included ice cream. There were provisions regarding, among other things, licensing and the adoption by the commissioner of the department of agriculture and markets of regulations to supplement and give full effect to the law, which latter stated that such regulations should establish "sanitary regulations pertaining to the manufacture and distribution of frozen desserts." Pursuant to the authority given him by the statute the commissioner adopted a regulation prohibiting the manufacture of frozen desserts in the cellar of any building in the State unless special permission therefor should be granted by him. The owner of a department store in New York City was granted permission by the commissioner to manufacture frozen desserts in the cellar of its premises for sale at retail, and the company then applied to the Department of Health of New York City for a permit to manufacture and sell at retail frozen desserts. Such a permit was refused because of a regulation of the city health department prohibiting the manufacture or exposing of frozen desserts in a cellar but empowering the board of health to make exceptions under certain conditions as to cellars used for such purpose before July 11, 1933. Such exception did not apply in the instant case. The city regulation had been adopted in accordance with the power conferred by the State legislature on the city department of health to adopt sections of the sanitary code and regulations thereunder not inconsistent with the constitution or laws of the State. It was conceded by city health department officials that the cellar involved was "without an equal in the city."

The court of appeals said that the question presented was whether the city could, on such facts, forbid that which the State had specifically permitted. It then went on to say that a municipality which was empowered to adopt health regulations could, in spite of general regulations by the State, adopt additional regulations or requirements where there was a real distinction between the city and other parts of the State. Such additional regulations had to be based upon special conditions existing in the city. But the court's view was that that was not the situation in the instant case. Said the court: "The State has gone over the whole field. The State has designated an official who is empowered to grant a permit after he has made an inspection and found the premises to be sanitary. After the issuance of such a

permit nothing remains to be done. The State having covered the whole field, the city may not make regulations of its own, inconsistent with the laws of the State, and prohibit the manufacture of frozen desserts in a cellar even though the cellar is sanitary and the manufacture of frozen desserts therein has been authorized by the State."

DEATHS DURING WEEK ENDED AUGUST 31, 1940

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Aug. 31, 1940	Corresponding week, 1939
Data from 87 large cities of the United States:		
Total deaths	7,241	[1] 7,019
Average for 3 prior years	7,184	
Total deaths, first 35 weeks of year	299,080	293,098
Deaths under 1 year of age	497	[1] 482
Average for 3 prior years	497	
Deaths under 1 year of age, first 35 weeks of year	17,552	17,633
Data from industrial insurance companies:		
Policies in force	64,944,214	66,767,749
Number of death claims	10,089	10,388
Death claims per 1,000 policies in force, annual rate	8.1	8.1
Death claims per 1,000 policies, first 35 weeks of year, annual rate	9.9	10.4

[1] Data from 88 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 7, 1940

Summary

A total of 758 cases of poliomyelitis was reported for the current week as compared with 606 for the preceding week and with a 5-year (1935–39) median of 436. The incidence continues heaviest in the East North Central and West North Central States, which reported 555 cases, or 73 percent of the current total, as compared with 405 cases, or 67 percent of the total reported last week. The cases of poliomyelitis reported since August 3 are given in the following table, by geographic areas:

Geographical area	Week ended—				
	Aug. 10	Aug. 17	Aug. 24	Aug. 31	Sept. 7
New England	3	11	5	4	5
Middle Atlantic	6	11	25	37	32
East North Central	92	144	256	263	346
West North Central	61	80	162	142	209
South Atlantic	28	46	59	57	74
East South Central	20	25	24	18	23
West South Central	23	23	39	19	15
Mountain	12	9	26	30	14
Pacific	30	40	27	36	40
Total	275	389	623	606	758

Increases for the current week are shown for all States in the East North Central group, the largest number of cases (139) being reported from Michigan, and for all States but one in the West North Central group, the largest number of cases (80) being reported from Iowa. In the South Atlantic area the cases reported in West Virginia increased from 41 during the preceding week to 51 and in Virginia from 7 to 17. Increases in the Pacific States were confined to Oregon and California.

255670°—40——4

Conditions with respect to the other 8 communicable diseases included in the weekly reports remained favorable, the cases in most instances being below the 5-year median expectancy. A new record was made for smallpox. For the first time since these weekly reports have been compiled, no case of smallpox was reported by any State.

Seventy-one cases of endemic typhus fever were reported, 25 of which were in Georgia, 17 in Alabama, and 12 in Texas.

For the current week the Bureau of the Census reported 7,313 deaths in 88 major cities of the United States, as compared with 7,274 for the preceding week, and with a 3-year (1937–39) average of 6,928 for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended September 7, 1940, and comparison with corresponding week of 1939 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939	
NEW ENG.												
Maine	1	1	1				14	1	1	0	0	0
New Hampshire	0	0	0				0	0	0	0	0	0
Vermont	0	0	0				0	14	4	0	0	0
Massachusetts	2	1	2				31	13	13	0	1	1
Rhode Island	0	0	0				0	4	0	0	0	0
Connecticut	0	0	0	1			5	5	3	0	0	0
MID. ATL.												
New York	8	13	15	[1] 8	[1] 1	[1] 2	102	46	74	0	3	3
New Jersey [2]	4	1	3	5	3	4	43	12	12	0	1	1
Pennsylvania [2]	5	10	18				33	17	27	4	3	2
E. NO. CEN.												
Ohio	3	15	15	19	1	1	18	10	12	1	3	2
Indiana [2]	4	19	12	8	4	11	5	4	6	1	0	1
Illinois [2]	9	14	14	3	3	6	23	14	16	0	1	3
Michigan [2]	4	5	7	5			51	4	13	1	0	2
Wisconsin	1	2	2	15	29	11	53	22	28	1	0	1
W. NO. CEN.												
Minnesota	7	5	5	1	2		9	6	6	0	0	0
Iowa	4	2	5	4			8	6	3	0	0	0
Missouri	8	2	13	1		8	2	0	4	0	0	1
North Dakota	6	1	1	2	1		0	1	1	0	0	0
South Dakota	1	0	0				0	2	0	0	0	0
Nebraska	1	0	1				2	1	1	1	0	0
Kansas	4	7	7	1			4	3	3	1	0	0
SO. ATL.												
Delaware	1	0	0				1	1	0	0	0	0
Maryland [2] [3]	1	3	3	2		1	5	1	4	0	1	1
Dist. of Col.	1	1	4			1	1	1	1	0	0	0
Virginia [2]	8	45	37	76	77		10	5	5	0	1	2
West Virginia [2]	7	7	7	15	3	10	2	1	1	3	1	1
North Carolina [4]	24	60	38	1		2	8	2	7	3	1	2
South Carolina [4]	7	30	24	120	191	94	18	2	2	0	2	0
Georgia [4]	10	34	31	14	22		2	1	0	0	0	1
Florida [4]	3	9	8	1	7		2	4	2	0	0	1
E. SO. CEN.												
Kentucky	3	9	14	1	5	5	7	1	3	0	2	2
Tennessee [3] [4]	8	16	22	11	11	11	25	7	5	0	0	1
Alabama [4]	6	41	31	3	36	26	5	2	3	1	1	1
Mississippi [3] [4]	18	26	25							2	0	0
W. SO. CEN.												
Arkansas	5	15	15	3	3	3	8	4	4	0	1	1
Louisiana [4]	7	5	5		6	6	2	0	3	0	1	0
Oklahoma [2]	3	6	11	15	5	12	2	4	4	0	1	0
Texas [4]	13	24	29	101	35	35	15	28	8	1	0	2
MOUNTAIN												
Montana	0	3	1	4	26	4	4	1	2	0	0	0
Idaho	0	1	1				0	4	1	0	0	0
Wyoming [2]	0	2	0				1	2	2	0	0	0
Colorado	13	3	5	1	10		3	9	9	0	1	1
New Mexico	5	6	4				5	0	1	0	0	0
Arizona	0	0	1	10	14	14	3	3	3	0	3	0
Utah [2]	1	0	0	2	2		6	12	3	0	0	0
PACIFIC												
Washington	0	1	1				8	30	13	2	0	1
Oregon [2]	3	0	0	1	3	5	5	4	4	0	0	0
California	8	10	20	4	11	11	25	21	23	0	1	1
Total	227	455	455	458	511	346	576	335	438	22	29	44
36 weeks	9,458	13,142	15,998	170,447	152,791	142,304	230,613	349,706	349,706	1,191	1,452	4,336

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 7, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39	Week ended		Median, 1935–39
	Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939		Sept. 7, 1940	Sept. 9, 1939	
NEW ENG.												
Maine	0	0	2	0	1	4	0	0	0	1	0	3
New Hampshire	0	3	0	1	0	0	0	0	0	0	1	0
Vermont	0	2	1	0	0	1	0	0	0	0	0	0
Massachusetts	3	5	5	22	18	23	0	0	0	2	3	5
Rhode Island	0	0	0	1	2	3	0	0	0	3	0	0
Connecticut	2	4	4	4	2	7	0	0	0	4	1	2
MID. ATL.												
New York	17	88	88	56	35	61	0	0	0	11	19	30
New Jersey [2]	4	43	13	26	25	18	0	0	0	3	7	14
Pennsylvania [3]	11	20	9	52	44	52	0	0	0	30	28	28
E. NO. CEN.												
Ohio	56	17	2	52	98	88	0	0	0	26	29	29
Indiana [3]	81	3	3	16	46	35	0	1	1	9	12	12
Illinois [2]	40	13	22	75	72	84	0	0	0	17	59	35
Michigan [3]	139	66	49	47	59	59	0	0	0	7	5	10
Wisconsin	30	5	4	48	61	46	0	0	0	0	4	4
W. NO. CEN.												
Minnesota	12	46	5	20	27	27	0	0	0	1	0	2
Iowa	80	2	3	13	7	18	0	1	1	0	6	5
Missouri	32	0	2	13	9	29	0	1	0	9	5	23
North Dakota	0	1	0	2	9	5	0	0	1	0	1	2
South Dakota	9	0	0	3	3	9	0	2	0	0	0	1
Nebraska	18	1	1	2	10	9	0	1	1	0	0	0
Kansas	58	0	0	24	32	31	0	0	1	7	7	9
SO. ATL.												
Delaware	0	0	0	1	0	0	0	0	0	2	4	1
Maryland [2 3]	0	2	2	13	14	15	0	0	0	1	6	11
Dist. of Col.	0	3	2	2	4	4	0	0	0	0	1	1
Virginia [2]	17	5	4	16	19	18	0	0	0	12	19	19
West Virginia [3]	51	1	2	15	29	29	0	0	0	9	23	19
North Carolina [4]	5	9	1	38	34	34	0	0	0	16	9	13
South Carolina [4]	1	12	1	7	16	7	0	0	0	21	18	19
Georgia [4]	0	0	0	19	14	13	0	0	0	39	15	23
Florida [4]	0	1	1	1	5	4	0	0	0	2	1	2
E. SO. CEN.												
Kentucky	17	3	4	20	27	27	0	0	0	13	27	40
Tennessee [3 4]	3	3	3	0	51	27	0	0	0	24	27	28
Alabama [4]	2	0	4	13	34	13	0	0	0	12	12	14
Mississippi [3 4]	1	0	0	9	11	9	0	0	0	13	6	13
W. SO. CEN.												
Arkansas	3	1	1	3	10	8	0	0	0	36	25	20
Louisiana [4]	2	1	2	2	7	3	0	0	0	25	11	19
Oklahoma [3]	6	2	1	9	6	8	0	0	1	28	30	26
Texas [4]	4	12	3	11	24	24	0	0	0	50	40	47
MOUNTAIN												
Montana	8	0	1	11	3	5	0	0	2	1	2	4
Idaho	2	0	0	10	2	2	0	0	0	2	3	3
Wyoming [3]	0	0	0	2	1	2	0	0	1	0	0	1
Colorado	3	5	2	11	8	8	0	2	2	6	13	6
New Mexico	1	3	1	0	7	5	0	0	0	9	5	6
Arizona	0	5	1	1	0	2	0	0	0	3	11	5
Utah [3]	0	0	0	4	6	6	0	0	0	0	0	1
PACIFIC												
Washington	14	0	1	5	13	10	0	0	10	1	2	2
Oregon [3]	5	4	0	3	6	7	0	0	3	1	5	5
California	21	45	25	45	51	64	0	6	2	7	15	15
Total	758	436	436	748	962	962	0	14	39	463	517	614
36 weeks	4,046	3,454	3,454	120,804	118,940	167,490	1,988	8,721	8,136	6,247	8,743	9,882

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended September 7, 1940, and comparison with corresponding week of 1939 and 5-year median—Continued.

Division and State	Whooping cough	
	Week ended	
	Sept. 7, 1940	Sept. 9, 1939
NEW ENG.		
Maine	38	11
New Hampshire	0	0
Vermont	11	20
Massachusetts	72	94
Rhode Island	0	30
Connecticut	44	63
MID. ATL.		
New York	266	316
New Jersey [3]	95	157
Pennsylvania [3]	250	299
E. NO. CEN.		
Ohio	335	167
Indiana [3]	11	58
Illinois [3]	176	227
Michigan [3]	173	131
Wisconsin	73	156
W. NO. CEN.		
Minnesota	22	59
Iowa	25	13
Missouri	30	13
North Dakota	3	15
South Dakota	2	4
Nebraska	8	5
Kansas	33	8
SOUTH ATLANTIC		
Delaware	7	5
Maryland [3] [5]	61	42
District of Columbia	3	11
Virginia [3]	80	39
West Virginia [3]	38	6
SOUTH ATLANTIC—continued		
North Carolina [4]	60	109
South Carolina [4]	16	36
Georgia [4]	23	32
Florida [4]	0	1
EAST SOUTH CENTRAL		
Kentucky	41	34
Tennessee [2] [4]	33	28
Alabama [4]	7	14
Mississippi [3] [4]	----	----
WEST SOUTH CENTRAL		
Arkansas	19	2
Louisiana [4]	4	5
Oklahoma [3]	12	7
Texas [4]	134	49
MOUNTAIN		
Montana	8	10
Idaho	0	4
Wyoming [3]	3	2
Colorado	14	23
New Mexico	18	6
Arizona	2	5
Utah [3]	24	44
PACIFIC		
Washington	48	18
Oregon [3]	5	21
California	215	71
Total	2,542	2,470
36 weeks	114,846	134,239

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended Sept. 7, 1940, 14 cases as follows: New Jersey, 1; Pennsylvania, 1; Indiana, 2; Illinois, 2; Maryland, 1; Virginia, 3; Tennessee, 1; Oklahoma, 1; Wyoming, 1; Oregon, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended Sept. 7, 1940; 71 cases as follows: North Carolina, 1; South Carolina, 4; Georgia, 25; Florida, 4; Tennessee, 2; Alabama, 17; Mississippi, 2; Louisiana, 4; Texas, 12.

WEEKLY REPORTS FROM CITIES

City reports for week ended August 24, 1940

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	81	28	11	197	266	235	3	335	78	1,196	----
Current week [1]	42	20	5	286	208	154	2	331	72	1,066	----
Maine											
Portland	0	----	0	0	0	1	0	0	0	4	19
New Hampshire:											
Concord	0	----	0	0	0	0	0	0	0	0	4
Manchester	0	----	0	0	0	0	0	0	0	0	13
Nashua	0	----	0	0	0	0	0	0	0	0	12
Vermont:											
Barre											
Burlington	0	----	0	0	0	0	0	0	0	0	10
Rutland	0	----	0	0	3	0	0	0	0	0	5
Massachusetts:											
Boston	0	----	0	25	2	8	0	8	2	62	166
Fall River	0	----	0	1	0	0	0	2	1	5	36
Springfield	0	----	0	0	0	0	0	0	0	2	28
Worcester	0	----	0	9	2	1	0	0	0	2	27
Rhode Island:											
Pawtucket	1	----	0	0	0	0	0	0	0	0	19
Providence	0	----	0	10	1	0	0	1	1	7	49
Connecticut:											
Bridgeport	0	----	0	0	1	0	0	1	3	0	26
Hartford	0	----	0	1	1	0	0	0	0	1	38
New Haven	0	----	0	2	2	0	0	0	0	22	32
New York:											
Buffalo	0	----	0	0	3	3	0	4	0	5	96
New York	7	4	0	55	22	26	0	68	11	117	1,142
Rochester	0	----	0	1	7	1	0	1	0	10	51
Syracuse	0	----	0	0	3	0	0	1	1	5	46
New Jersey:											
Camden	0	----	0	1	4	1	0	0	1	0	30
Newark	0	----	0	23	1	4	0	1	0	32	71
Trenton	1	----	0	0	1	0	0	3	1	5	43
Pennsylvania:											
Philadelphia	1	2	1	27	8	7	0	12	4	71	423
Pittsburgh	0	----	0	3	7	3	0	6	0	23	120
Reading	0	----	0	1	1	0	0	2	0	25	25
Scranton	0	----	----	0	----	1	0	----	0	0	----
Ohio:											
Cincinnati	0	----	0	0	2	1	0	11	0	15	114
Cleveland	0	6	0	2	4	2	0	11	2	59	182
Columbus	2	----	0	1	0	2	0	1	0	39	79
Toledo	0	----	0	0	2	0	0	3	0	7	62
Indiana:											
Anderson	0	----	0	1	0	0	0	0	0	0	10
Fort Wayne	0	----	0	0	0	1	0	1	0	1	24
Indianapolis	0	----	1	0	2	1	0	3	1	6	81
Muncie	0	----	0	0	2	0	0	1	0	1	8
South Bend	0	----	0	0	0	0	0	0	0	0	15
Terre Haute	0	----	0	0	0	0	0	0	0	0	19
Illinois:											
Alton	0	----	0	0	3	0	0	0	0	0	10
Chicago	2	----	1	16	17	19	0	44	4	75	547
Elgin	0	----	0	0	1	0	0	0	0	4	8
Moline	0	----	0	0	0	0	0	0	0	0	8
Springfield	0	----	0	0	2	0	0	0	0	4	22
Michigan:											
Detroit	0	----	0	39	6	14	0	20	1	84	210
Flint	0	----	0	2	2	0	0	0	1	3	20
Grand Rapids	0	----	0	1	0	0	0	0	0	19	38
Wisconsin:											
Kenosha	0	----	0	0	0	1	0	0	0	0	9
Madison	0	----	0	1	2	0	0	0	0	0	21
Milwaukee	0	----	0	17	0	4	0	0	1	10	79
Racine	0	----	0	0	0	0	0	0	0	2	7
Superior	0	----	0	0	0	1	0	0	0	0	6

[1] Figures for Barre and Boise estimated; reports not received.

City reports for week ended August 24, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Minnesota:											
Duluth	0		0	0	0	0	2	0	0	1	7
Minneapolis	0		0	1	2	2	0	2	0	13	72
St. Paul	0		0	0	3	3	0	1	0	3	57
Iowa:											
Cedar Rapids	0			0		1	0		0	0	
Davenport	0			0		0	0		0	1	
Des Moines	2		0	0	0	1	0	0	0	1	29
Sioux City	0			0		0	0		0	1	
Waterloo	0			0		1	0		0	0	
Missouri:											
Kansas City	0		0	0	3	0	0	3	1	3	82
St. Joseph	0		0	1	2	0	0	2	1	0	33
St. Louis	1	1	0	0	5	5	0	7	1	17	176
North Dakota:											
Fargo	0		0	0	1	0	0	0	0	1	6
Grand Forks	0			0		0	0		0	1	
Minot	0		0	0	0	0	0	0	0	0	11
South Dakota:											
Aberdeen	0			0		0	0		0	1	
Sioux Falls	0		0	0	0	1	0	0	0	0	8
Nebraska:											
Lincoln	0			0		0	0		0	0	
Omaha	0		0	0	1	1	0	1	0	1	51
Kansas:											
Lawrence	0		0	1	0	0	0	0	0	0	3
Topeka	0		0	0	1	1	0	0	0	1	15
Wichita	0		0	0	2	1	0	1	0	3	31
Delaware:											
Wilmington	0		0	0	3	1	0	2	0	0	26
Maryland:											
Baltimore	1	3	1	1	7	1	0	11	0	77	185
Cumberland	0		0	0	0	0	0	0	0	0	11
Frederick	0		0	0	0	0	0	0	0	1	2
Dist. of Col.:											
Washington	3		0	2	7	3	0	13	5	6	119
Virginia:											
Lynchburg	0		0	1	0	0	0	0	0	1	9
Norfolk	0		0	0	0	1	0	0	0	4	27
Richmond	0		0	1	1	4	0	1	0	0	38
Roanoke	0		0	2	1	0	0	0	0	11	7
West Virginia:											
Charleston	0		0	0	1	0	0	0	0	0	20
Huntington	0			0		0	0		0	0	
Wheeling	1		0	0	2	0	0	1	1	6	22
North Carolina:											
Gastonia	0			0		0	0		0	0	
Raleigh	0		0	0	0	0	0	0	0	1	10
Wilmington	0		0	0	0	0	0	1	0	0	15
Winston-Salem	1		0	1	0	2	0	0	0	9	25
South Carolina:											
Charleston	0	2	0	13	2	0	0	1	2	0	24
Florence	0		0	0	0	0	0	0	0	0	8
Greenville	0		0	0	1	0	0	1	0	0	11
Georgia:											
Atlanta	3		0	0	0	4	0	7	0	2	76
Brunswick	0		0	0	0	0	0	0	0	0	2
Savannah	0		0	0	1	0	0	1	0	0	29
Florida:											
Miami	0	1	1	0	0	0	0	1	0	1	30
Tampa	0		0	0	2	0	0	1	0	0	30
Kentucky:											
Ashland	0		0	0	0	0	0	1	0	0	4
Covington	0		0	0	0	0	0	0	0	1	1
Lexington	0		0	9	0	1	0	1	0	2	12
Louisville	0		0	3	1	2	0	1	0	0	57
Tennessee:											
Knoxville	0		0	0	0	0	0	0	1	0	24
Memphis	1		0	0	1	0	0	4	10	11	72
Nashville	0		1	5	4	0	0	2	3	6	60
Alabama:											
Birmingham	0		0	1	4	2	0	4	0	0	81
Mobile	0		0	0	2	0	0	0	0	0	24
Montgomery	0			0		0	0		0	0	

City reports for week ended August 24, 1940—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Arkansas:											
Fort Smith	0	----	----	0	----	0	0	----	0	0	----
Little Rock	0	----	0	0	0	0	0	0	0	0	----
Louisiana:											
Lake Charles	0	----	0	0	1	0	0	1	0	0	4
New Orleans	6	----	0	2	9	0	0	11	1	15	149
Shreveport	1	----	0	0	4	0	0	4	3	0	64
Oklahoma:											
Oklahoma City	0	----	1	0	3	1	0	0	0	0	33
Tulsa	0	----	0	1	0	0	0	2	0	4	30
Texas:											
Dallas	1	----	0	1	0	0	0	1	0	0	61
Fort Worth	0	----	0	0	0	6	0	1	0	2	23
Galveston	0	----	0	0	1	1	0	0	1	0	12
Houston	1	----	0	2	2	0	0	5	2	1	87
San Antonio	1	----	0	0	7	0	0	8	2	21	57
Montana:											
Billings	0	----	0	0	1	0	0	0	0	4	5
Great Falls	0	----	0	1	0	0	0	0	0	3	8
Helena	0	----	0	0	0	0	0	0	0	0	6
Missoula	0	----	0	0	0	0	0	0	0	0	8
Idaho:											
Boise	----	----	----	----	----	----	----	----	----	----	----
Colorado:											
Colorado Springs	0	----	0	0	0	0	0	1	0	0	4
Denver	5	----	0	0	4	3	0	4	0	6	89
Pueblo	0	----	0	0	1	1	0	0	0	0	13
New Mexico:											
Albuquerque	0	----	0	0	0	0	0	3	0	1	10
Utah:											
Salt Lake City	0	----	0	3	4	3	0	1	1	8	33
Washington:											
Seattle	0	----	0	1	4	1	0	2	2	9	93
Spokane	0	----	0	0	0	2	0	0	0	0	27
Tacoma	0	----	0	0	2	0	0	0	0	0	44
Oregon:											
Portland	0	----	0	2	1	3	0	1	0	5	77
Salem	0	----	----	0	----	0	0	----	0	0	----
California:											
Los Angeles	3	2	0	8	2	5	0	22	0	90	301
Sacramento	0	----	0	2	1	5	0	1	1	1	26
San Francisco	0	----	0	0	7	2	0	5	0	19	150

City reports for week ended August 24, 1940—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Worcester	1	0	1
New York:			
Buffalo	0	0	1
New York	1	0	1
Rochester	0	1	1
Pennsylvania:			
Philadelphia	0	0	5
Pittsburgh	0	0	1
Ohio:			
Cincinnati	0	0	8
Cleveland	0	0	1
Indiana:			
Anderson	0	0	1
Fort Wayne	0	0	4
Indianapolis	1	1	4
South Bend	0	0	6
Terre Haute	0	0	1
Illinois:			
Chicago	1	0	6
Moline	0	0	1
Springfield	0	0	1
Michigan:			
Detroit	0	0	3
Grand Rapids	0	0	5
Wisconsin:			
Madison	0	0	10
Minnesota:			
Duluth	0	0	1
Iowa:			
Cedar Rapids	1	0	0
Des Moines	0	0	2
Sioux City	0	0	3
Waterloo	0	0	7
Missouri:			
Kansas City	0	0	4
St. Joseph	1	1	0
St. Louis	0	0	1
South Dakota:			
Sioux Falls	0	0	1
Nebraska:			
Lincoln	0	0	1
Omaha	0	0	5
Kansas:			
Topeka	0	0	1
Wichita	0	0	2
Virginia:			
Richmond	0	0	1
West Virginia:			
Huntington	0	0	11
Kentucky:			
Ashland	0	0	2
Louisiana:			
New Orleans	0	0	6
Shreveport	0	0	1
Oklahoma:			
Oklahoma City	1	0	0
Texas:			
Dallas	0	0	2
Houston	0	0	2
Montana:			
Billings	0	0	1
Helena	0	0	1
Colorado:			
Denver	0	0	1
New Mexico:			
Albuquerque	0	0	1
Utah:			
Salt Lake City	0	0	2
Washington:			
Seattle	0	0	4
Tacoma	0	0	3
Oregon:			
Portland	0	0	1
California:			
Los Angeles	0	0	7
Sacramento	0	0	1

Encephalitis, epidemic or lethargic.—Cases: New York, 1; Newark, 1; Topeka, 1; Denver, 1; Sacramento, 3.
Pellagra.—Cases: Boston, 1; Birmingham, 3; San Francisco, 1.
Typhus fever.—Cases: New York, 3; Savannah, 4; Birmingham, 1; Montgomery, 1; New Orleans, 1; Houston, 4.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended August 3, 1940.—During the week ended August 3, 1940, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1		1	1			1		4
Chickenpox		1	1	118	160	14	12	3	11	320
Diphtheria		3		14		2	1			20
Dysentery					1					1
Influenza		3							60	63
Lethargic encephalitis									1	1
Measles	12			37	98	34	42	12	18	253
Mumps				1	36		1	2	3	43
Pneumonia		1			7		1		4	13
Poliomyelitis		1		2	1					4
Scarlet fever		1		29	42	10	5	6	6	99
Tuberculosis			4	77	69	5		4		159
Typhoid and paratyphoid fever			3	5	7				3	18
Whooping cough			2	178	79	9	27	6	35	336

CUBA

Provinces—Notifiable diseases—4 weeks ended June 22, 1940.—During the 4 weeks ended June 22, 1940, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		2	2	8		11	23
Chickenpox		1				3	4
Diphtheria	1	9		2		1	13
Leprosy		1				1	2
Malaria	6	5		7	1	55	74
Measles		3	2	6	1		12
Poliomyelitis		1		3			4
Scarlet fever		3					3
Tuberculosis	19	49	16	68	5	30	187
Typhoid fever	22	118	10	16	26	36	228

SWEDEN

Notifiable diseases—June 1940.—During the month of June 1940, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	1	Poliomyelitis	15
Diphtheria	42	Scarlet fever	2,195
Dysentery	11	Syphilis	33
Epidemic encephalitis	2	Typhoid fever	2
Gonorrhea	779	Undulant fever	10
Paratyphoid fever	37	Weil's disease	2

YUGOSLAVIA

Notifiable diseases—4 weeks ended June 16, 1940.—During the 4 weeks ended June 16, 1940, certain notifiable diseases were reported in Yugoslavia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	23	1	Poliomyelitis	2	1
Cerebrospinal meningitis	277	39	Scarlet fever	202	1
Diphtheria and croup	355	21	Sepsis	3	2
Dysentery	19	2	Tetanus	40	13
Erysipelas	127	4	Typhoid fever	191	9
Favus	2	----	Typhus fever	32	9
Lethargic encephalitis	1	----	Whooping cough	1	----
Paratyphoid fever	24	----			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—A cumulative table giving current information regarding the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS of August 30, 1940, pages 1594–1597. A similar table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Macao.—During the week ended August 31, 1940, 20 cases of cholera were reported in Macao, China.

Plague

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Area.—A rat found near Kukaiau on August 6, 1940, and another rat found on August 7, 1940, near Paauilo, both in Hamakua Mill Area, Hamakua District, Island of Hawaii, T. H., have been proved positive for plague.

Yellow Fever

Ivory Coast—Tekodogo Circle.—During the week ended August 10, 1940, 2 suspected cases of yellow fever were reported in Tekodogo Circle, Ivory Coast.

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